DEC 17 1909

THE IRON AGE

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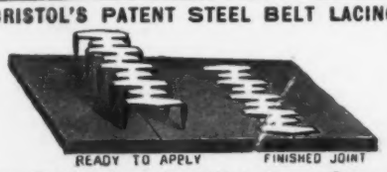

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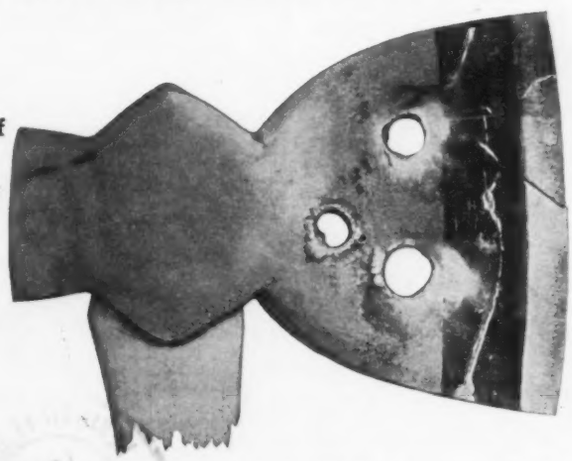

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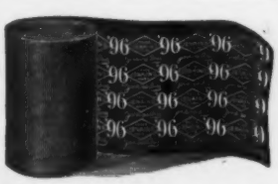

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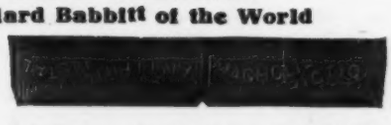

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THE IRON AGE

New York, Thursday, December 16, 1909.

Titusville Gas Engines.

The Titusville Iron Company, Titusville, Pa., has recently installed for the South Penn Oil Company, Bradford, Pa., at its station near Simpson, McKean county, three vertical three-cylinder engines of 175 brake hp. each, arranged for belt connection to air compressors for supplying air for pumping oil wells. This type of engine is now in successful operation, driving air compressors, hydraulic pumps and electric generators. Two of these engines, each directly connected to a 105-kw. alternating current generator, were installed in the Titusville Electric Light & Power Company's station at the beginning of this year, and their performance is reported to be very satisfactory. Only one of the engines is required for the day load, but at night the two are synchronised and operated in parallel. A general view of the engines in this station is shown in Fig. 1, and a sectional view in Fig. 2. Fig. 5 shows the general design of the bedplate and crankshaft.

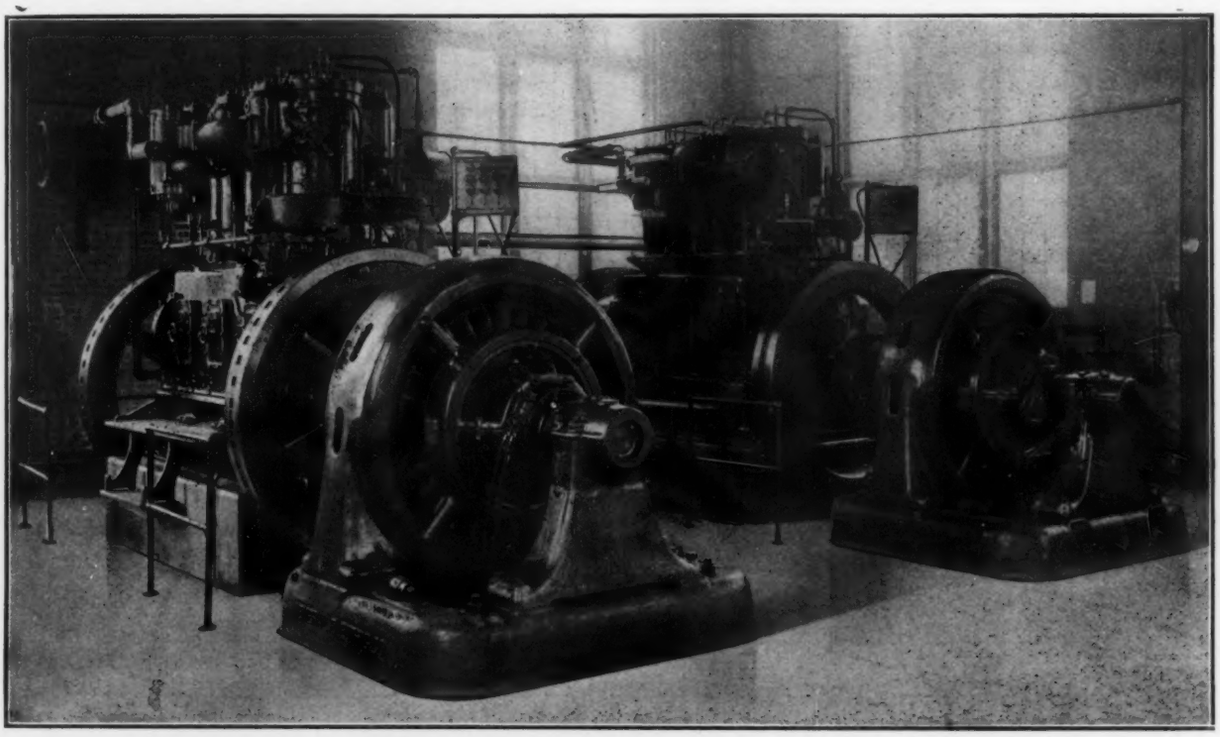


Fig. 1.—Two Vertical Three-Cylinder Titusville Engines in the Titusville Electric Light & Power Company's Station.

The cylinders are 14 in. in diameter by 18 in. stroke. The revolutions are 257 per minute, giving a piston speed of 771 ft. per min. The bedplate is of very substantial design and is cast separate from the housing or main frame. The main bearings, four in number, have bottom boxes of cast steel lined with babbitt, and are adjustable by wedges from the outside of the bedplate. The crankshaft is a solid forging of open hearth steel with cast iron balance weights securely bolted to each crank web. The generator shaft was furnished with the generator and is connected to the engine shaft by a flexible coupling shown in Fig. 1.

The connecting rods, one of which is shown in Fig. 3, are of forged steel, and have solid ends with wedge adjustment at the piston pin, and the crank ends are of the marine type. The piston pin bearing is of special bronze and the crank pin bearing is of bronze lined with babbitt. The connecting rod bolts are turned down to the diameter at the root of the thread for a considerable portion of their length, so as to make them more elastic under sudden shocks.

The water jacketing of the cylinder barrels is entirely independent from that of the cylinder heads, and the drain from each cylinder head is piped directly into the exhaust pipe. This acts as a silencer and also keeps the exhaust valve stems so cool that there is no need for water jacketing them. Stems and valves which have been in operation for about two years are still in good condition. The inlet and exhaust valve chambers are cast on opposite sides of the cylinders, and the valves are operated from independent cam shafts extending along the inside of the main frame. All stems extend downward and the valves can easily be taken out for examination, by simply removing the cover on top of the valve chamber.

The ignition is of the mechanical make-and-break type. The latest type of igniter plug is shown in Fig. 4. It is located on the side of the inlet valve chamber. Its gasket is formed of a copper end asbestos ring and makes the joint close to the inner wall of the chamber. The oval flange is free of the outer wall of the chamber and the body of the plug is cut away as much as possible to allow air to circulate around it and keep it cool. The movable electrode is actuated by a trip, driven by an eccentric on a small shaft, which in turn is driven by a silent chain from the exhaust cam shaft. The timing of the spark can be advanced or retarded by raising or lowering the trip rod for each cylinder independently, and by means of a graduated quadrant on this raising and lowering device the attendant can tell at once the point of stroke where the spark is occurring. The ignition current for both engines is furnished at 115 volts, and a bank of lamps placed in a prominent position on the engine affords the necessary resistance and acts as a tell-tale to indicate that the sparking is taking place properly in each cylinder.

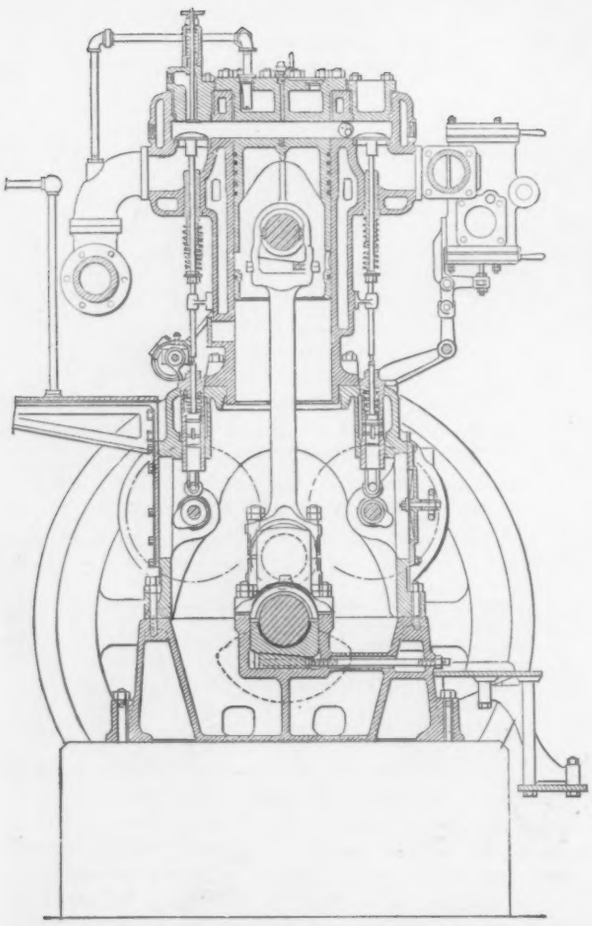


Fig. 2.—Sectional View of the Titusville Engine.

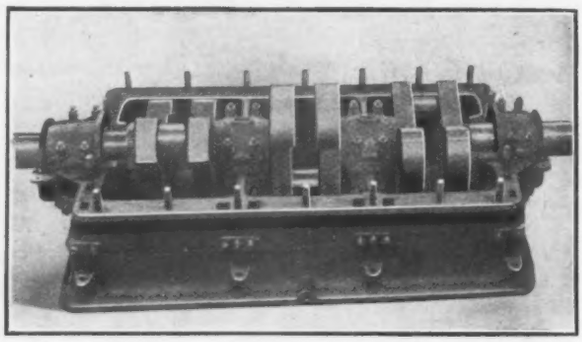


Fig. 5.—Detail of the Bedplate and Crankshaft.

apparatus is so efficient that an engine can be started and synchronised with the other in 45 seconds.

The exhaust from each engine is led separately to a muffler tank placed under ground outside of the building, and then passes to the atmosphere through a larger pipe from the muffler tank up to beyond the roof of the building. This effectually prevents any annoyance of sound or gaseous vapor.

A typical indicator card taken when the engine was developing 176 brake hp. is shown in Fig. 6. In tests for gas consumption at different loads it has been found that 9.4 cu. ft. of gas per brake hp. is required at full

Fig. 6.—Typical Indicator Card.

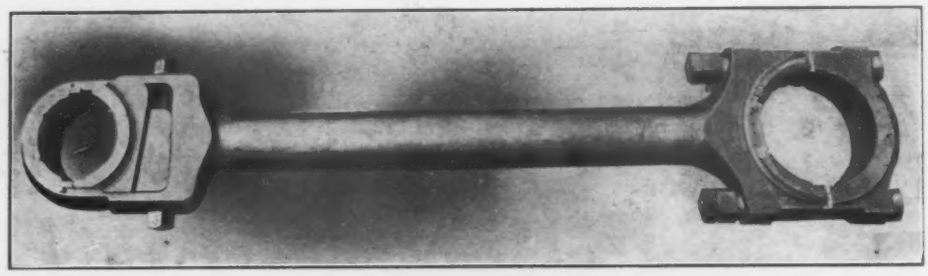


Fig. 3.—One of the Connecting Rods.

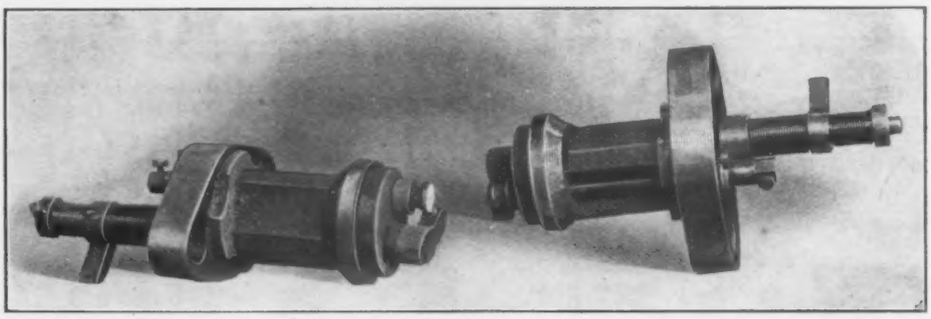


Fig. 4.—Igniter Plugs.

Current is also furnished by an Edison primary battery for starting and for use in cases of emergency.

The engine is started by admitting compressed air to one of the cylinders through a valve operated automatically by a cam on the outer end of the exhaust cam shaft. The governor is of the fly ball type, connected to the mixing valve by a shaft and levers, and governs the quantity of the mixture passing into the engine. A small series motor operated by the exciter current and controlled by a switch on the switchboard is used for synchonising; it is bolted to the governor bracket and through a worm gear regulates the tension on the controlling spring of the governor to vary the speed of the engine. This device combined with the air starting load; 9.8 cu. ft. at three-quarter load, and 12.5 cu. ft. at half load.

The generator, built by the General Electric Company is of substantial design, and in general appearance harmonizes with the engine. Although rated at 105 kw., it has frequently carried loads of 135 kw. for hours at a time.

The Fort Pitt Engineering Company, composed of J. B. Cessna and E. P. Dandridge, has opened offices in the Lewis Building, Pittsburgh. The company is local representative of the Stephens-Adamson Mfg. Company, Aurora, Ill., manufacturer of elevator, conveyor and coal washing machinery.

The Welfare of Employees.*

The Yale & Towne Mfg. Company's Provisions Against Injury and Ill Health.

BY HENRY R. TOWNE.

It is an old adage that prevention is better than cure. Preventive medicine is an increasingly important factor in medical practice. Pensions and old age insurance are designed to be a partial remedy for the disabilities and needs of old age. Anything tending to prevent or to delay the advent of these disabilities should certainly be recognized and encouraged. If effective, it not only defers the time when aid may be needed, but prolongs the period of activity and usefulness of the individual.

In considering the pension problem we are sometimes apt to forget or overlook the large expenditures which are being made continually for purposes tending to prolong the period of usefulness of employees and to delay the advent of disability. While these expenditures have usually been incurred primarily for purposes not largely, if at all, altruistic, they have none the less tended to improve the comfort and health of employees. The expenditures referred to relate to the following provisions affecting the efficiency, health and comfort of employees:

1. Heating and ventilating.
2. Sanitation, drainage and water supply.
3. Effective lighting by day and by night.
4. General cleanliness of premises.
5. Wholesome drinking water, filtered if necessary and properly cooled.
6. Comfortable and sanitary lavatories.
7. Locker rooms, with individual lockers for each employee.
8. Emergency service; provisions for first aid to injured.
9. Removal of dust and noxious fumes, where these are incident to manufacturing processes.
10. Safety appliances on machines, to prevent or minimize danger of accident.
11. Libraries, reading rooms and lecture rooms where these exist.

Many of these provisions are more or less necessary to the effective operation of a plant, but beyond the expenditures strictly necessary for this purpose, it will be found in many cases that a large additional expenditure has been made chiefly for the promotion of the comfort, health and safety of employees, while others have been incurred solely by consideration on the part of the employer for the welfare of his employees. The aggregate effect of these many provisions is greatly to promote the comfort of employees, and undoubtedly they have a further tendency to prolong the period of useful efficiency and, therefore, presumably the expectation of life, in the case of all employees who are fortunate enough to come within the scope of these benefits.

Investment and Maintenance Cost at Stamford.

Persons unfamiliar with the organization and operation of a modern industrial plant have but little idea of the extent of the provisions referred to, and still less idea as to what they represent in initial investment and in operating cost. To elucidate this point and to furnish a basis of fact on which an intelligent understanding of this subject may be formed, I think it will be helpful to study the figures applying to an actual case fairly representative of good modern practice. For this purpose I have naturally taken the statistics relating to the industry conducted under my direction, namely, that of the Yale & Towne Mfg. Company, whose works are located at Stamford, Conn., and which is best known as maker of the Yale locks. Stated under the two heads of "Investment" and "Operating Expenses," these statistics are substantially as follows:

Investment.

1. Heating and ventilating	$74,200
2. Sanitation, drainage and water supply	49,400
3. Lighting, electric and gas	18,000
4. General cleanliness	0
5. Drinking water, filtration, refrigeration and distribution	6,200
6. Lavatories (included in item 2)	0
7. Locker rooms and lockers	57,200
8. Emergency room and equipment	1,200
9. Apparatus for removal of dust and fumes	8,000
10. Safety appliances on machinery	4,000
11. Library, reading rooms, lecture rooms and bicycle sheds	7,000
Total	$225,200

Annual Operating Expenses.

1. Heating and ventilating	$14,620
2. Sanitation, drainage and water supply	6,324
3. Lighting, electric and gas	3,129
4. General cleanliness	4,811
5. Drinking water	932
6. Lavatories (included in item 2)	0
7. Locker rooms and lockers	6,467
8. Emergency room	1,303
9. Apparatus for removal of dust and fumes	1,200
10. Safety appliances on machinery	445
11. Library, reading rooms, lecture rooms and bicycle sheds	6,206
Total	$45,437

In round figures the foregoing statements imply an investment for the above purposes of about $100 per employee and an annual expenditure of about $20 per employee. While admitting frankly that this expenditure, both fixed and current, is "good business," because tending to increase the efficiency of labor and the contentment of employees, it can with equal fairness be stated that, if limited strictly to business requirements, these outlays, both fixed and current, would largely be reduced, probably one-half, and that the excess over what is necessary represents, on the one hand, a voluntary contribution by the employer to the welfare, comfort and health of the employee, and, on the other hand, a substitute or equivalent to the employee of a direct contribution to an insurance or pension fund, because serving indirectly a similar purpose by increasing the earning power, by prolonging the activity and thus by augmenting the potential savings of the employee. In considering the broad subject of industrial insurance and pensions, it is pertinent to keep in view the character and influence of the expenditures thus made by the employer, especially in modern plants of the best type, and to recognize the substantial contribution thus made for the benefit of the employee.

In like manner, those who are active in forwarding the movement for industrial insurance and pensions, recognizing these facts, should make it part of their work, when studying individual plants, to note the extent to which welfare work of all of the classes above specified has been carried, to award praise where it is justified and to stimulate improvement where it is needed, especially in plants of the older type and of minor character, and in localities where effective inspection and supervision have not yet been undertaken by the State.

To conclude as I began, "Prevention is better than cure," and while seeking effective remedies for all existing evils arising from unavoidable causes incident to the operations of organized industry, equal attention should be given to the great possibility of reducing or eliminating such evils by preventive or alleviative measures. While seeking both, the effort should be, first, to eliminate all preventable injury or impairment of health and efficiency, and, second, to aid and compensate those who may be injured by conditions which are necessary and unavoidable.

* A paper read at the New York meeting of the National Civic Federation, November, 1909.

German Methods in the Manufacture of Cast Iron Pipe.

Gustav Simon, Oberhausen, Ruhr, Germany, has an extended article in *Stahl und Eisen,* of November 3, 1909, on the "Manufacture of Cast Iron Pipe." He says that cast iron pipe have not only to withstand interior pressure, but also internal and external shock and the action of the bedding material. Specifications, therefore, take these things into account, as may be seen by referring to the standard specifications for cast iron pipe for the several countries that have issued them.

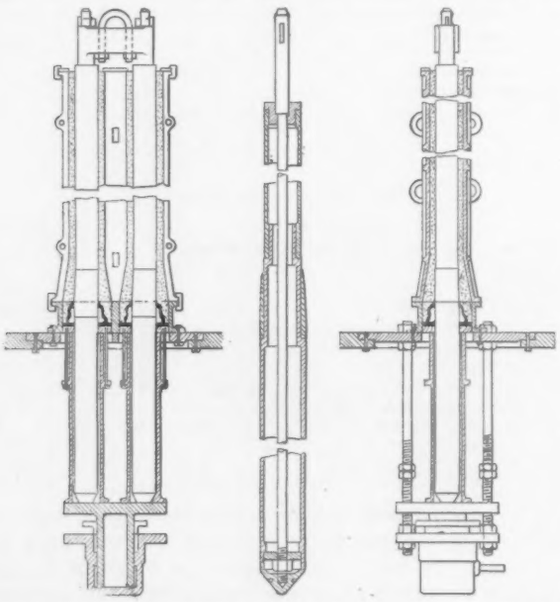


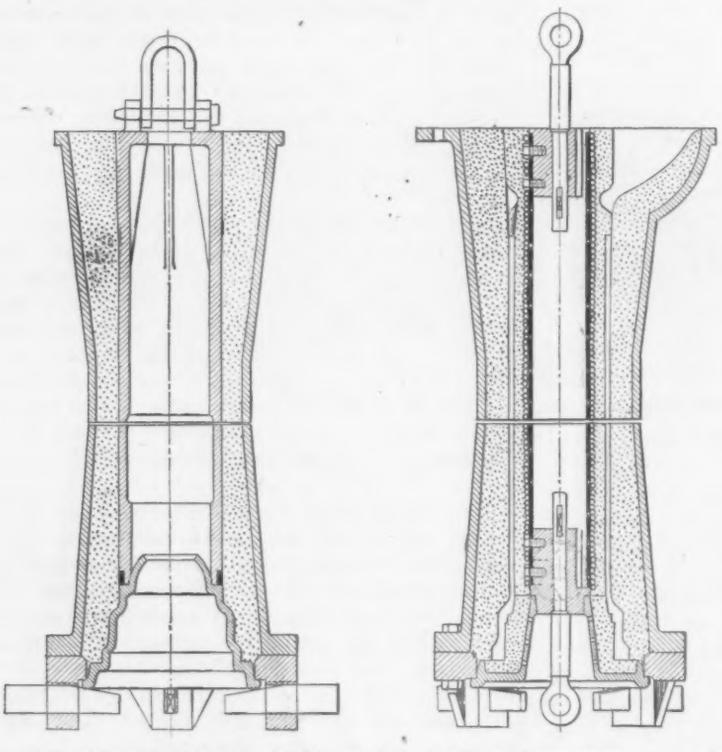
Fig. 1.—Method of Molding Cast Iron Pipe at R. D. Wood & Co.'s Foundries.

Before going into the methods in use in Germany, reference is made in the article to the excellent system of R. D. Wood & Co., Philadelphia, which is particularly adapted to the smaller diameters. Fig. 1 shows the molds made in couples. The operation of drawing accomplishes the ramming. The pattern for the outer surface of the socket is pressed into the molding sand, and the pattern—the plunger—for the outer surface of the body of the pipe is set just to the top of the socket pattern and then drawn through the sand, compressing it properly. The upper portion of the plunger being smaller in diameter and having a conical portion between it and the pattern part, when the plunger is drawn upward by hydraulic means the above mentioned compression takes place. The illustration shows the construction of the pipe molding machine. In operating this machine, the pipe flask is placed on the flask containing the socket pattern and connected with it. Loose sand is now dropped into the flask. The valve being opened, the plunger rises to the distance of the lock nuts, which is just the hight of the socket. The socket pattern is thus taken upward and pressed into the pipe flask. At the same time the plunger is pulled upward, completing the mold. The plunger is now lowered and with it goes the socket pattern. It may be mentioned that the conical and lower portion of the plunger is a steel casting as the wear is naturally very severe.

The German Method.

The German method of making pipe is shown in Figs. 2, 3 and 4. The apparatus consists of a flask with centering device attached, a socket pattern, the pipe pattern proper, the socket core and the pipe core. The flask is of cast iron parted longitudinally and machined at the joints. It is also parted transversely in several places. Thus in case of accident it is cheaper to replace a broken section, odd lengths of pipe can be made, and it is possible to cast the socket upward if so desired. The wedging of the flask parts is shown in Fig. 4, which is an improvement on the usual methods illustrated in Figs. 5 and 6, and to be much preferred from the practical standpoint.

One half of the flask is fastened to suitable supports; the other is intended to be movable, for directly after casting the connection must be loosened to avoid casting strains in the pipe. The flask should be heavy



Figs. 2 and 3.—Method of Molding Pipe at German Foundries.

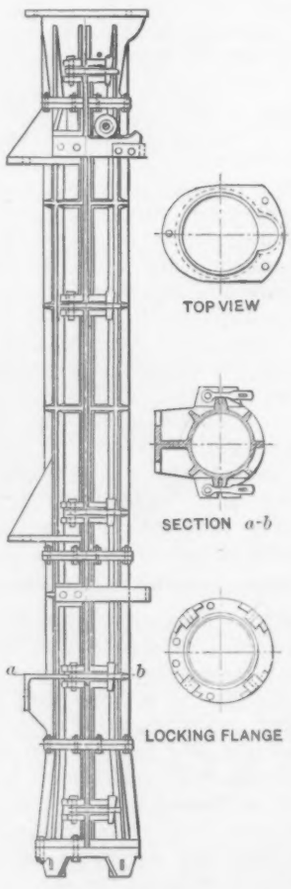
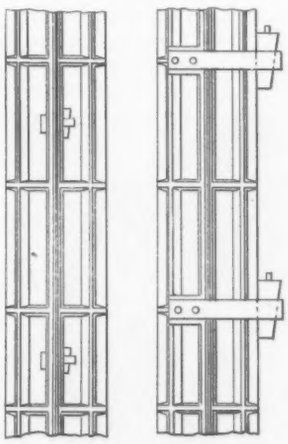


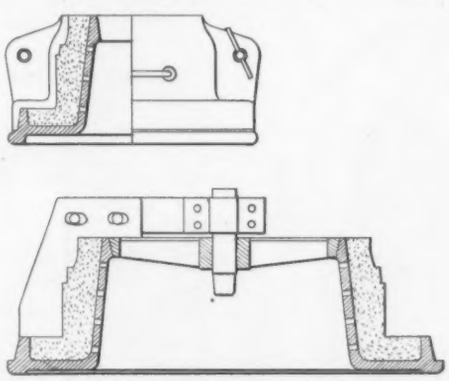
Fig. 4.—Pipe Flask with Special Locking Device.

enough and provided with ribs, as well as perforations to facilitate the escape of gases. The illustrations show the method of closing the bottom of the flask and the centering device giving the best results. It is needless to say that the flasks must be placed vertical



Figs. 5 and 6.—Flask Locked by Wedges.

and fastened securely during the ramming operation. The pipe pattern is of cast iron, carefully turned where the guides are touched as well as the sand. The socket pattern is first put up into the carefully closed flask, and fitted exactly into the centering flange. If this is not done, or the flange is loose, bad pipes will result. The pipe pattern is now placed on the socket pattern, and must fit squarely. A guide at the top is seldom required, as with proper care in ramming this is not necessary. After the flask is rammed up, the pattern is withdrawn, this requiring considerable power. To ease this up, the pattern is often made a trifle smaller in diameter at the bottom, or else, particularly in small pipes, a steel ring is shrunk on the



Figs. 7 and 8.—Method of Making Socket Cores.

bottom of the pattern and turned up conically, so that in drawing up the pattern a compression is exerted on the sand. The outer diameter of this ring will then give the proper size of the pipe.

After the molds are blackened, the flasks are placed in the oven for drying. Drying with hot air is better than with the ordinary coke firing, having the advantage of a cleaner foundry, and is to be preferred even to drying by the use of gas. With hot air the drying can be done just where wanted and to the extent desired, which is not the case when an oven is used.

The preparation of the cores is the work of a special department. Where the pipe is cast socket downward, the core consists of two parts. The pipe core proper is placed on the socket core, the centering arrangement shown in the illustrations serving this purpose also.

Figs. 7 and 8 show the method of making the socket cores. For the smaller ones a cast iron corebox in two parts is placed on the socket patterns. The large socket cores are swept up in loam, as shown.

The pipe core proper is generally swept up on arbors. Only in some of the Swiss pipe foundries is ramming up with sand resorted to. The arbors are of cast iron, well supplied with perforations for venting.

Of late it has become the custom to pour pipe with direct metal, or rather a mixture of cupola iron and metal direct from the blast furnace. Usually direct metal with a relatively higher silicon content than the cupola metal is used, as this iron will hold its heat longer—a necessary procedure where the distance and the quantity taken to the foundry are great.

Dumping the flasks is an important item. In well designed foundries, the same flask is used eight and sometimes ten times during a double turn. Attention is necessary so that the pipes may not be taken out too fast, for often very small things are the cause of unnecessary losses. The usual finishing operations are then carried out.

Safety Appliances in Factories.

A lantern slide description of the work of the Safety Committee of the United States Steel Coroporation, made at a presentation in Rochester, N. Y., by Director William H. Tolman of the Museum of Safety and Sanitation, New York, so impressed the superintendent of the Rochester Railway & Light Company that he came to Dr. Tolman at the close of the lecture and told him what a fine idea that was of the United States Steel Corporation, saying, "I can see no reason why a Committee of Safety cannot be organized in my company, employing 2500 people." Some three weeks later, following a lecture by Dr. Tolman, under the auspices of the Empire State Gas & Electric Association, in New York, he had the pleasure of hearing Mr. Russell describe the work of the Rochester Safety Committee and its various sub-committees.

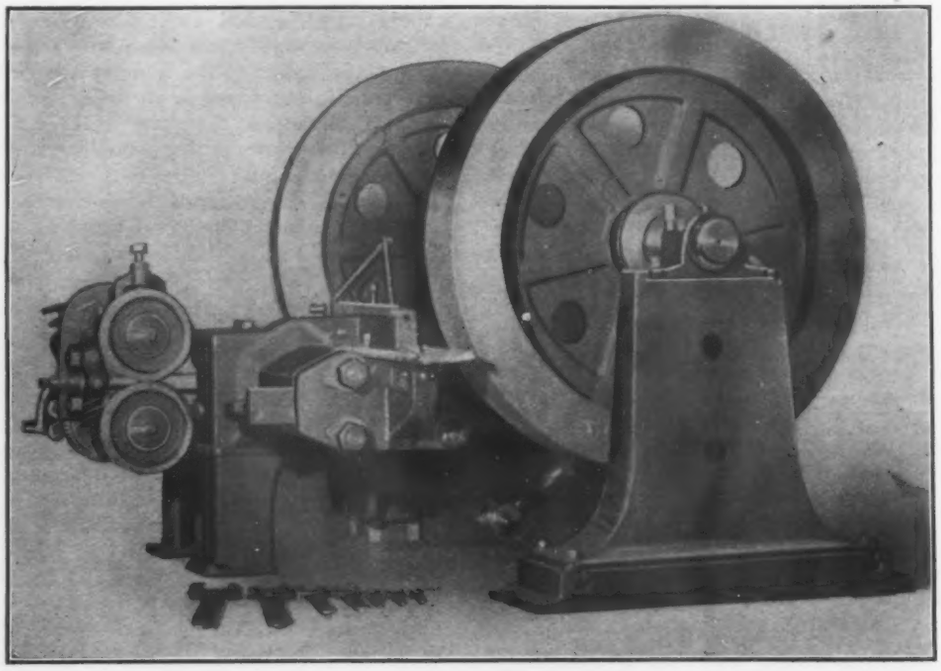
In lecturing again, December 1, under the auspices of the Rochester Chamber of Commerce, the Director of the Museum called attention to the object lesson which the United States Steel Corporation has given through its Committee of Safety. At the conclusion, the vice-president of the Rochester Railway & Light Company stated that he was personally indebted to the United States Steel Coroporation, because he was sure that, since the organization of its own Safety Committee, his life had been made safer in going about his company's plant and premises.

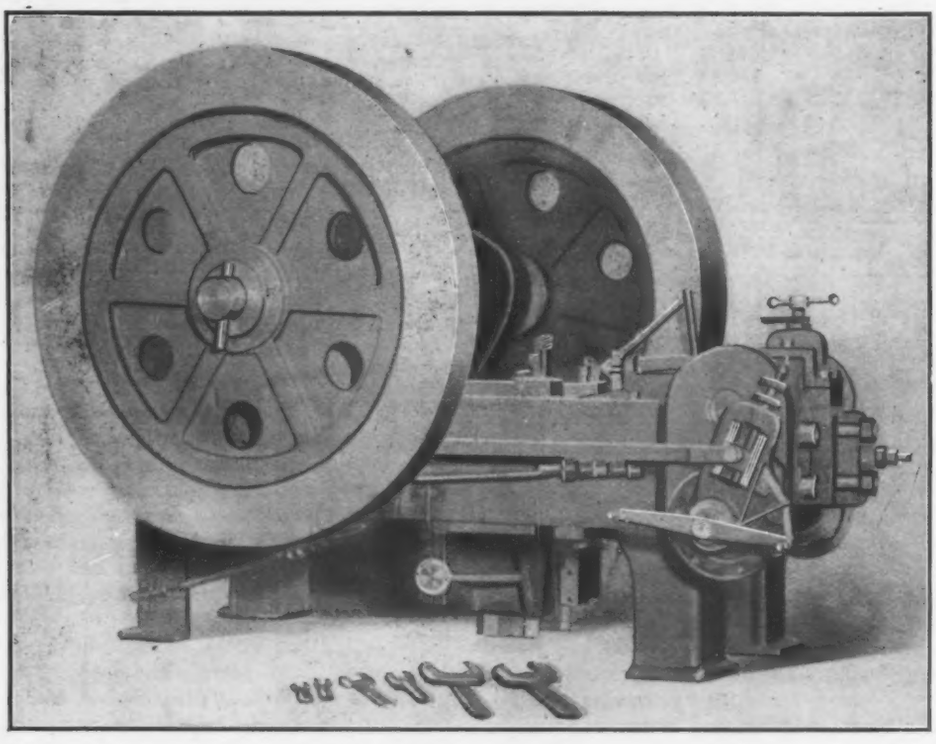
The Wire Goods Company Expands.—The Wire Goods Company, Worcester, Mass., has acquired the wire goods department of the E. Jencks Mfg. Company, Pawtucket, R. I. A new corporation has been formed at Pawtucket to carry on the knitting machine department of the business, under the name of the Jencks Knitting Machine Company. The wire goods end of the business retains the old name of the E. Jencks Mfg. Company, which is one of the oldest concerns in the line in the country, having manufactured wire goods for 50 years. The business will be retained at Pawtucket for the present, but doubtless will ultimately be removed to the Worcester plant of the Wire Goods Company. The policy of the Jencks Company will remain unchanged. Its New York agents, John H. Graham & Co., will be retained. The new owner will, however, apply its own methods and machinery to the work, with the idea of modernizing manufacturing. The product is wire hardware, a specialty being made of cotter pins.

Notices were posted November 30 by the American Iron & Steel Mfg. Company, Lebanon, Pa., of a general advance in iron rolling mill wages, the new schedule being based on $4.50 for puddling instead of $4.

A Powerful Waterbury-Farrel Cold Header.

The No. 6 solid die double stroke geared header of the Waterbury-Farrel Foundry & Machine Company, Waterbury, Conn., is remarkable for its capacity, taking work up to ⅞ in. in diameter and 4 in. long. So far as is known, this is the only cold header producing work automatically up to such size. While the company has not departed materially from its established design the machine is interesting in the details of its construction. Power and strength have been applied in a large way. The frame is a steel casting and the quantity of metal has not been lessened on account of its better quality, as will be seen in the fact that the weight of the machine is 42,600 lb.





Views of Opposite Sides of a Cold Header for Heavy Work Built by the Waterbury-Farrel Foundry & Machine Company, Waterbury, Conn.

The heading slide is actuated by a powerful knuckle joint. All other motions are taken from gears which turn once for two revolutions of the crankshaft. Thus great heading power is given to the slide, and one finished rivet is produced for each two turns of the flywheels. A solid die block for a round heading die is furnished with the standard machine. The die is unusually large to give it ample strength, and is backed by a hardened tool steel plate which distributes the pressure of the heading operation to the frame. The die block is held in the frame by a double key fastening, and the punches are firmly fixed in the punch holder and are so arranged as to permit of easy adjustment and replacement. The shifting slide for moving the punches up and down is a long steel casting well guided in the main slide. It is cam actuated, deriving its motion in such a way that there is no tendency for the punches themselves to get out of line. As the pressure needed in this machine is tremendous the toggles

are made with exceptionally large surface, and their pins are of tool steel, hardened and ground.

The crankshaft is of large diameter and rotates in bronze lined bearings in the frame. Each flywheel has a safety slip joint. One wheel is of extra width and weight and is used for the driving belt. The face of the other wheel is provided with cored holes for use with a pinch bar for turning the crankshaft by hand. The heavier flywheel necessitates the outboard bearing, which is furnished with a pedestal and sole plate to connect the bearing with the foundation under the machine. The gears which are used to time the various motions and to transmit their power are carried on heavy studs held in the frame. These gears have cams for actuating the knockout and shifter movements, and crank pins from which the feed and cut-off mechanisms are driven. The cam rolls have large face and tool steel liners at surfaces where the heaviest work takes place.

The powerful cutting-off device is driven from a crank plate through a connection provided with a safety shear pin. The cut-off slide has a fiddle bow finger and is operated by the company's standard double cam mechanism, which has an easy motion for the cutting off proper and a quick motion for the transfer. The feed mechanism is especially adapted to large work. The wire is fed in the usual way through ratchet driven rolls, which, however, instead of closing tightly together when there is no work between them are kept apart by an adjustable stop, so that they may receive the next wire readily. The feed rolls deliver the wire against a rigid feed stop which regulates exactly the length of feed. The feed roll ratchet is driven by three pawls. Provision is made for operating a fine adjustment of the length of feed while the machine is running. The knockout is actuated from a cam on one of the gears and is adjustable for different lengths of work.

The stroke of the heading slide is 7 in.; the diameter of the heading die, 5½ in.; the diameter of the headings punches, 3⅜ and 3⅞ in.; the diameter of the feed rolls, 15 in.; the extreme length of feed, 6 in.; the diameter and face of the outer flywheel, 70 x 12½ in.; the diameter and face of the inner flywheel, 70 x 6½ in.; the speed of the wheels, 70 rev. per min.; the floor space required, 10 ft. 8 in. square, and the weight of the machine, 42,600 lb.

Labor Disputes in Canada.—The following statistics covering labor strikes and lockouts in Canada, as given in the recent report of the Minister of Labor, are furnished by Consul Paul Lang of Sherbrooke: During the two years in which the industrial disputes act has been in operation 55 disputes were dealt with, of which all except two were settled without strike or lockout, and in these two cases the findings of the conciliation boards were finally accepted. The calendar year 1908 was remarkable for the few strikes and lockouts in Canada, the number being 69, a decrease of 82, which was fewer than in any of the preceding seven years. The only disputes of serious consequence were those affecting the cotton mill hands in various companies in the Province of Quebec and the strike of machinists employed along the lines of the Canadian Pacific Railway.

The Illinois Tunnel Company, operating the freight subway in Chicago, has been in the market recently in an effort to obtain 2000 freight cars for use in its extensive tunnel system. Great difficulty has been encountered in getting steel axles for these cars, as the mills which have the facilities for rolling them are booked so far ahead on business from regular customers that they have been unable to promise shipment until several months after the placing of specifications.

Rail Carbon Steel Bars.

The Inland Steel Company, Chicago, in its catalogue of shapes rolled at its Chicago Heights mill, has presented an interesting discussion of what the company has named "rail-carbon" steel, to designate bars and other products rolled from old steel rails. It is pointed out that all rails when ordered by railroads are required to conform to certain rigid specifications, and before being accepted are tested chemically and physically to determine this. The reheating and rerolling of this material improve its quality for many purposes.

Section of an Old Steel Rail, Showing Where It Is Split for Rerolling Into Bars.

Before the rerolling, a rail is split into three pieces, so that the head, the web and the flange are used separately for the sections for which they are most suitable, and the ends of the web are cut off to remove the portion containing the holes for the joint. The material is rolled into bars suitable for agricultural implements, bedsteads, concrete reinforcement and many other commercial forms for which a stiff hard steel is often more suitable than soft steel.

The peculiar merits of this material for concrete reinforcement are emphasized. Experts who have made exhaustive tests have pointed out that the elastic limit is the quality of steel which measures its value for reinforcement. Prof. Arthur M. Talbot of the University of Illinois, in a bulletin on reinforced concrete, says: "Reinforcement as high as 1½ per cent. for steel of 33,000 lb. per square inch elastic limit and 1 per cent. for steel of 55,000 lb. per square inch elastic limit may be used without developing the full compression strength of the concrete."

Physical tests of rail-carbon bars show that the elastic limit is greater than 50,000 lb. per square inch and usually runs 55,000 to 70,000 lb., while twisted rail-carbon bars will run higher. It is stated that in mild or medium soft steel the elastic limit is usually 30,000 to 35,000 lb., thus showing a great advantage in economy in favor of rail-carbon bars for reinforcement.

Pittsburgh Foundrymen Preparing for the Convention.

The foundrymen in the Pittsburgh District have already commenced to make arrangements for entertaining the convention of the American Foundrymen's Association to be held in Pittsburgh in June, 1910. At the regular monthly meeting of the Pittsburgh Foundrymen's Association, held on the evening of December 6, Joseph T. Speer of the Pittsburgh Valve, Foundry & Construction Company presided and announced the committees for that occasion as follows:

Joseph T. Speer, Pittsburgh Valve, Foundry & Construction Company, chairman of the General Committee; E. A. Kebler, M. A. Hanna & Co., chairman of the Reception Committee; E. D. Frohman, S. Obermayers Company, chairman of the Smoker and Get-Together Committee; J. S. Seaman, Seaman-Sleeth Company, chairman of the Finance Committee; W. A. Bole, Westinghouse Machine Company, chairman of the Plant Visitation Committee; H. E. Field, Mackintosh, Hemphill & Co., chairman of the Convention Committee; O. W. Mason, Midland Steel Company, chairman of Ladies' Entertainment Committee; F. H. Zimmers, Union Foundry & Machine Company, chairman of the Boat Ride Committee.

THE MECHANICAL ENGINEERS' CONVENTION.

Thirtieth Annual Meeting, New York, December 7 to 10, 1909.

While the attendance at this meeting was not as large as that at the last annual meeting, it cannot be charged to a lack of interest in the programme prepared; for, although the standard set one year ago was unusually high, the papers and excursions this year could hardly be considered much, if any, less attractive. The explanation for the falling off in attendance may very properly be attributed to the fact that the industrial prosperity now existing made it impossible for many to attend on account of business. Rather does the society deserve congratulation for having drawn together such a large number of members at such a time.

Practically the plan adopted last year of entirely separating the professional sessions and excursions was repeated, with the one exception, that the Wednesday afternoon session was omitted to allow every one to take in the inspection of the nearly completed terminal of the Pennsylvania Railroad in Manhattan. This left but four instead of five periods for the consideration of papers. Even in proportion to the time allowed there were not so many papers as before, and the arrangement proved an improvement, for it did not unduly limit the time allowable for discussions. Where last year there were 22 papers covered in the five sessions, including those of the simultaneous session of the gas power section, there were this year but 15 papers and four sessions. In consequence there was no necessity of cutting off a discussion when it was at the hight of its interest. The most animated discussion was brought out by the papers dealing with Venturi meters and Pitot tubes, bituminous gas producers, ball and roller bearings, pumping engine valves, cooling towers and leaky vertical fire tube boilers.

The very elaborate programme of excursions, referred to more at length later on, was almost too attractive as evidenced by the numbers that were drawn away from the professional sessions. Particularly interesting proved to be the excursions to the International Steam Pump Company's works, the power plants of the Interborough Rapid Transit Company, the New York Edison Company, the Brooklyn Rapid Rapid Transit Company, the National Phonograph Company's factory, Crocker-Wheeler Company's works and the works of the De La Vergne Machine Company. The social features were also very attractive. Counted as one of these was the president's address, and reception on the opening night which was reported in *The Iron Age* December 9, and the address given in full in another part of that issue. The reception and dance Thursday evening, the one really formal feature of the convention, was perhaps the most imposing affair of the sort that the society has ever held. It took place in the new ballroom of the Hotel Astor, which was only recently opened; in fact, this was the first dance ever given in the new ballroom.

For the preparations for this convention, the local committee deserves the highest credit. For the first time the entire expense of the entertainment was borne by the local members, just as it is borne by the local members in other cities where the spring meetings are held. The society proper was absolutely at no expense for any of the social features involved in this meeting, all of the funds having been raised by subscription.

SECOND SESSION.

The annual business meeting was convened in the auditorium on Wednesday morning. The report of the Council was read by Secretary Calvin W. Rice, as was also the report of the tellers on the election of new members; 166 new members in all grades were elected since the last meeting. The Plant Operations Committee of the Gas Power Section reported that in accordance with the instructions of the secretary of the section a standard set of forms had been prepared for the operation of gas power plants and submitted details of these forms.

Three amendments to the constitution were taken up next. The first of these dealt with the qualifications for associate membership, and the principal change was the raising of the minimum age limit from 26 to 30 years; the second related to the admission of junior members, and declared that a person over 30 years of age was not eligible for junior membership; the last provided for the addition to the list of standing committees of a new one to be known as the Public Relations Committee. After some discussion, it was voted to submit these amendments to the entire membership by letter ballot.

Prof. D. S. Jacobus reported for the Power Test Committee that the committee had gone over all the codes relating to tests and amended them where necessary to bring them all into harmony.

Prof. D. S. Jacobus also reported for the Committee on a Standard Tonnage Basis for Refrigeration and gave a résumé of what had already been accomplished.

Prof. C. E. Lucke presented the report of the Standardization Committee of the Gas Power Section, which was in the nature of a preliminary one. Prof. D. S. Jacobus and R. H. Fernald discussed the report at some length.

WEDNESDAY AFTERNOON EXCURSION.

The Pennsylvania Tunnel & Terminal Railroad Company's new passenger station and terminal at Seventh avenue between West Thirty-first and Thirty-third streets, was inspected by the members and guests of the society, through the invitation of the company's chief engineer, Mr. George Gibbs. The visitors were met by representatives of the railroad company and conducted in parties through the terminal which is now in the finishing stages. This is the most extensive public service plant, and one of the greatest engineering accomplishments in the world. The passenger station building is 784 ft. long, 430 ft. wide, with an average hight above the street of 69 ft. and a maximum hight of 153 ft. The area of the building at the track level is 7.74 acres. The groups of visitors were shown through the arcade, waiting rooms, concourse, service plant, &c. The impressive features of the concourse are the large skylight area, and the structural iron work, which is sufficiently ornamental so as not to necessitate the covering of it with plaster. The service plant contains all the apparatus for lighting, heating and ventilating the terminal. The boiler room consists of five batteries of boilers, each of 525 hp., equipped with automatic stokers.

WEDNESDAY EVENING LECTURE.

Through the courtesy of Dr. B. T. Galloway, Chief of the Bureau of Plant Industry of the United States Department of Agriculture, an illustrated lecture was given in the evening in the auditorium by L. W. Ellis of that bureau entitled. "The Era of Agricultural Machinery."

THIRD SESSION.

The first professional session convened in the auditorium on Thursday morning and was devoted to the

consideration of four papers dealing with the measurement of the flow of fluids. The first of these was

Tests on a Venturi Meter for Boiler Feed.

BY PROF. CHAS. M. ALLEN, WORCESTER POLYTECHNIC INSTITUTE.

This is a report of a complete series of tests on a 2-in. meter made at the Worcester Polytechnic Institute to determine whether a Venturi meter is sufficiently accurate under all conditions encountered in practice to be used to measure boiler feed. The apparatus was set up in the most convenient way, not only for weighing the water used, but also for heating it before it passed through the meter and for pumping. Four sources of supply were used; an injector, a duplex pump, a triplex power pump, and a pressure tank, all drawing water from a pit having a steam line to heat the water. As the capacity of the pit was large, an even temperature could easily be maintained. The water was discharged into 5000-lb. weighing tanks after passing through the meter. Cold water tests were first made to determine the coefficient of the meter; followed by tests with conditions the same as those in boiler rooms, the temperature ranging from 80 to 180 degrees F., while the pressure also was varied by different arrangements of the auxiliary apparatus. The results obtained showed that the meter tested was best adapted for use in a plant of over 200 hp., and as the maximum and minimum variations noted were 3 and 0.82 per cent., respectively, the Venturi meter is adapted to measure hot water provided the proper size is used.

In the absence of the author the paper was presented in abstract by the secretary. Meantime the author arrived and added a few facts, which were that the test was made as a result of numerous inquiries received regarding the best form of hot water meter and that the addition of a sensitive recording apparatus would give much better results than those obtained.

F. N. Connett, in discussing the paper, said that the correction for temperature was not so important with this type of meter as with mechanical meters for measuring volumes, as the Venturi meter automatically compensates for half the difference in specific gravity due to the change in temperature. The severe pulsations of the feed pumps in his opinion interfere with the accuracy of the results and either two or three stage turbine pumps would give better results, although an air chamber placed on the pump so that the water would enter it and pass out with a uniform velocity would help to overcome the evil influence of pulsations in the pump. The inaccurate results obtained where the velocity was low were due to the inertia of the mercury in the manometer, as in meters where a larger amount was used fluctuations and inaccuracies were avoided.

Clemens Herschel, the inventor of the Venturi meter, was present as an invited guest of the society and spoke at this point. He called attention to the fact that these tests have shown the meter to be reliable for measuring the flow of hot water, which is a more or less unique service. He stated that several thousand Venturi meters are in use all over the world and are operated exactly the same for all sizes of main pipe from ¼ in. to 10 ft. in diameter. They are but little dependent on a correction by coefficients. They are also used to measure gases, brine and chemicals, and now, although it was not anticipated, a new use has been found for the smaller sizes, that of measuring hot water.

The secretary read a contributed discussion from Sanford A. Moss, who thought that some information as to the method of making the computations should be included. The results given in the paper were not what might have been expected, as they showed that the flow in pounds per hour with a given pressure increased as the density decreased, due to the rise of temperature.

Efficiency Tests of Steam-Turbine Nozzles.

BY PROF. FREDERICK H. SIBLEY AND T. S. KEMBLE, CLEVELAND, OHIO.

The effect of the shape of the nozzle upon the efficiency of a steam turbine had not been determined prior to 1905, and a series of tests were begun at the Case School of Applied Science to determine the proper proportions and efficiencies of steam turbine nozzles for given steam conditions. The results obtained in the final tests which extended over two years are given in the paper. Three methods of determining the efficiency are, measuring the force of the jet when it impinges on an external surface, investigating the character of the jet by means of a search tube, and measuring the reaction of the nozzle when a jet of steam is flowing through it. The method employed was a combination of the second and third, as this tended to give results which probably would be more accurate than those obtained from either method alone. Eighteen different nozzles of varying lengths, cross sections and finishes were tested. These included tests to determine the rate of flow through the various nozzles, calibration tests to determine the accuracy of the springs used to determine the reactions, and search tube tests to determine the pressure at the muzzle of the nozzle. When these were completed the reaction tests were begun. The reaction of any nozzle is defined by the authors as the summation of all the components, parallel to its axis, of the pressures within the nozzle and in the chamber from which it leads; numerically this is equal to the pull of the spring measuring the reaction increased or diminished by the difference between the apparent and true reactions due to the pressure in the plane of the muzzle being either less or greater than that of the surrounding medium. Preliminary reaction tests were run on all the nozzles, and two were selected for the final tests. These were exhaustive and of long duration, and the results are given in curves and tables appended to the paper. Smoothness of finish is apparently more important than contour, as no appreciable difference in efficiency is shown either with a variation of the cone angle between 9 and 20 degrees or variations in contour.

Prof. Carl C. Thomas read this paper in the absence of the authors, and at the conclusion of the reading the secretary read a contributed discussion from J. A. Moyer, which stated that the methods used were more accurate than the impact plate method used by Lewicki, and that the results confirmed those obtained by Steinmetz and the writer, which showed efficiencies of well designed nozzles for relatively large and small pressures of over 97 per cent. One point criticized was that not enough data was given to determine the effect of varying the length of the nozzles upon the efficiency and its was suggested that a comparison of nozzles having the same taper or angle but different lengths should be made, as all the nozzles tested were probably longer than was necessary to secure the highest efficiency. Although the moisture error was probably not large, the use of superheated steam would have eliminated all doubt on this point. The reaction was apparently the same for varying superheats, but this could be determined from the thermodynamic equations for flow and velocity.

Professor Thomas in discussing the paper questioned the correctness of the statement that the apparent reaction must be corrected by the difference in pressures between the plane of the muzzle and the surrounding medium as the eddy currents set up in the nozzle rendered corrections unnecessary. The third paper was

The Pitot Tube as a Steam Meter.

BY PROF. GEO. F. GEBHARDT, CHICAGO, ILL.

Steam meters may be divided into two general classes: series and shunt meters. This division is based upon the proportion of the fluid that passes through the measuring apparatus. Notable examples of the first type are the St. John's and Venturi meters, while the Pitot tube forms the basic principle for practically all meters of the latter class, although considerable difficulty has been experienced in measuring vapors condensable under normal operating conditions by this method, and there is no commercially successful instrument on the market. The object of this paper is to describe a number of applications of the Pitot tube for steam measurements at the Armour Institute of Technology. Several modifications in the standard type of tube were made, such as the substitution of a boiler gauge glass and cocks for the manometer, the introduction of a device for overcoming surface tension, and a chamber for determining the aspiration effect of the steam. The tests showed that the simple gauge glass meter was limited in its application to commercial work and certain other modifications were made. While sufficient tests have not been made with these new forms to indicate how reliable they are, the author is of the opinion that a steam meter for commercial purposes should be at least autographic and preferably integrating. The ideal meter is one which shows at a glance the weight of steam

flowing for any length of time and which may be read as easily as a watt hour meter.

The author being absent, the secretary presented the paper. A communicated discussion from Prof. W. B. Gregory corrected the date of the invention of the Pitot tube as 1730; it was evidently a misprint in the paper, which gave it as 1837. He believes that the author has developed a practical instrument of real value, but he considered the device for determining aspiration effects as unreliable and criticised the construction of the device illustrated in the paper.

A. R. Dodge took exception to the statement made that on account of the great density of the mercury and the variation in hight of the condensed vapor above the mercury this application of the Pitot tube has very little value scientifically or commercially, as the General Electric Company has been using this principle in the construction of recording meters, and a series of tests made on three of these meters selected at random from a lot of 50 gave results within 1½ per cent., while nine-tenths of the readings were within ½ per cent. of the actual results when used on pipe varying in diameter from 2 to 36 in.

An Electric Gas Meter.

BY PROF. CARL C. THOMAS, MADISON, WIS.

The meter described in this paper is designed for measuring the rate of flow of gas, air or steam, and depends for its operation upon the principle of adding electrically a known quantity of heat to the gas and determining the rate of flow by the rise in temperature of the gas between the inlet and outlet of the meter. Two methods of operation may be employed; one in which the difference of temperature between the inlet and outlet is kept constant, and the other in which the energy input is constant and the temperature varies. In the former the amount of electrical energy input forms a measure of the rate of flow, as the watts supplied varies directly with the weight of the gas flowing through the meter, the energy input being measured with a recording or integrating watt meter. The difference of temperature is kept constant by an autographic temperature recorder which automatically cuts the resistance required to maintain the constant difference in and out of the circuit. The second method of operation requires the supply of current at a constant voltage and the maintenance of a constant resistance of the meter, so that the dissipation of electrical energy in the meter is uniform. Here the difference of temperature between the inlet and outlet rises and falls according to the variation in the rate of flow of the gas.

The first method is the better of the two, as it is easier to maintain a constant difference of temperature than a constant dissipation of electrical energy. Although the latter was used in developing the meter described, those to be placed on the market will employ the other and less cumbersome method, as a record of the watts input is all that is required to determine the flow of gas through the meter. These meters have been calibrated with both illuminating gas and air, and although the calibration under actual service conditions is depended upon to secure quantitative results, their nature is such that the quantity of gas or air passing through them can be closely calculated from a knowledge of the energy input and the specific heat and the accuracy of the readings checked in this way. The meter is not affected as regards its accuracy by changes in the pressure of the gas or air, so that it may be employed for measuring gas or air at either high or low pressures and temperatures, provided the materials are suited to the conditions. This method of measuring gas seems especially useful for engines operated by producer or blast furnace gas, and in connection with the measurement of the discharge of gas or air from compressors, as the fluctuations do not affect the thermometers and the true average results are obtained.

Following an abstract of this paper by the author, a contributed discussion was read from Prof. L. S. Marks. The writer considered the paper a very valuable contribution, but thought that the possibilities of error should be fully examined. The instrument is fundamentally one for determining the weight of a gas or vapor flowing through it and is made to record the volume flowing through. This record is not of the actual volume passing, but of this volume referred to standard conditions of temperature and pressure. The author has made no mention of this point, but it is nevertheless an important one, as a variation of 5 degrees F., or 0.3 lb. pressure, would cause an error of 1 per cent. if the instrument recorded actual volumes. The calibration may be made by passing a known volume of gas at a known temperature and pressure through the meter and then reducing the results obtained to standard conditions. In his opinion the accuracy of the instrument depended upon the accuracy and constancy of the volumetric specific heat, which is dependent upon the volumetric composition of the gas and the volumetric specific heat of the constituents.

W. D. Ennis in his discussion said that in his opinion proper correction had not been made for fluctuations in pressure, and that while the change in specific heat might measure them to some extent, the change in pressure would correspond to the change in absolute temperature of the gas which was not at all comparable to the change in specific heat.

E. D. Dreyfus congratulated the author upon the excellence of his paper and stated that it had been his experience that a deposit of impurities occurred in gas piping and asked if such was the case here and what effect such deposit upon the resistance grids had had upon the accuracy of the thermometers. A. R. Dodge inquired if the amount of power required to make this meter operate as a steam meter was known, as 545 kw. were required to operate the meters employed to measure the steam used at the stations of the New York Edison Company.

In closing the discussion Professor Thomas said that the amount of power required to measure a given quantity of steam as compared with the same volume of gas was about 2 to 1. With regard to the effect of impurities upon the accuracy of the temperature indications, he said that the meter had been in operation only three months and only a slight amount of impurities had been noticed. As a result of a number of tests on samples of gases, he found that the specific heat does not vary to any great extent while it is a very easy matter to obtain the variation for any one plant. The meter was as accurate when passing 40 cu. ft. per hour as when measuring the suction of a 60-hp. gas engine. The results obtained can be checked by calculations, while the moisture present exists as a part of the gas. The meter was constructed to measure the specific heat of the gases passing through, and almost all the questions raised by the discussors were brought up before the meter was constructed by gas men and they were satisfied with the results obtained.

General Section.

The main session of Thursday afternoon, held in the auditorium, considered five papers on steam engineering topics. The first paper presented was

Tan Bark as a Boiler Fuel.

BY DAVID MOFFAT MYERS, NEW YORK.

The question of utilizing waste as fuel in manufacturing plants has attracted considerable attention in power plant circles. Much of this class of material contains moisture in larger or smaller quantities, and as tan bark is generally considered to possess a larger percentage of moisture than any other of the moist fuels, its correct treatment may indicate to some extent the proper method of dealing with the others. The author has been engaged in testing, remodeling, operating and constructing steam plants depending partly or principally upon tan bark for fuel, and has incorporated the results of this work in his paper. The heat value of a ton of ground hemlock bark is equivalent to 0.42 ton of coal, and leaching does not affect this ratio except as the actual weight may be varied. A point of particular interest in this connection is the small amount of ash and the large amount of oxygen present in the fuel. Increased efficiency may be secured by firing the fuel in specially designed furnaces and using presses to reduce the amount of moisture in the bark before firing, or by the addition of coal in the proportion of 1 to 6. Reports of tests made with different types of boilers and furnaces are appended.

A. A. Cary, in opening the discussion, said that he considered the paper a very valuable contribution. The destruction of the lower end of the firebrick tubes through which the fuel was fed is a great objection

to the use of tan bark as boiler fuel, but he thought that if the inrush of air that followed the dropping of the cone of fuel could be prevented this destructive action might be checked, although he did not think it possible with hand firing, and automatic stoking in some form or other seemed to him the only remedy. An arched bearing bar under the grate also helped to spread the charge over the entire grate. Everything possible should, in his opinion, be done to reduce the amount of water in the fuel before firing, on account of the great amount of heat required for the evaporation of the water.

Wm. Kent regarded the paper as the most important one on the subject since Professor Thurston's, which was presented in 1871. Driving the moisture out by means of tan bark presses and the use of waste heat would materially aid in the process of combustion. Prof. L. P. Breckinridge considered the methods of supplying fuel and air important, and suggested that sketches showing these be added. The next paper on the programme was

Cooling Towers.

BY J. R. BIBBINS, NEW YORK.

Developments of recent years in both steam and power plants have demonstrated the usefulness of the cooling tower. This piece of auxiliary apparatus has always been more or less neglected. It is true that in some plants the maximum effectiveness of the cooling tower and that of the condensing plant are in a sense diametrically opposed—one profits by the shortcomings of the other. The tower works best when the vacuum is lowest. On the other hand, this tends to a general operative equilibrium and often saves the day when two interdependent types of equipment would succumb. Fortunately, improvement in condensers is being actively pushed, the trend being to secure higher hot well temperatures. This immediately enhances the effectiveness of the cooling tower. Similarly, in gas power plants, the possibility of cooling jacket water by means of this apparatus is favored by the high temperatures of discharge which prevail in engines of good construction. It is not an impossible state of affairs for the jacket water in a gas power plant to cost more than the fuel, if not cooled and used over again, so that from all standpoints the cooling tower is worthy of careful study.

It is the object of this paper to bring into concrete form for discussion the most prevalent ideas in cooling tower construction, and a simple, inexpensive type employing lath mats is suggested together with suggestions for a combination of natural draft and forced draft types. The performance data included in the paper are merely to give some idea of the general characteristics of the latter type of cooling tower under various conditions of operation, rather than to represent the results of a highly scientific test.

Geo. J. Foran, in opening the discussion of this paper, regarded it as very timely and well presented, and expressed his gratification that the author had been able to devote the amount of time required to prepare it. W. D. Ennis, in referring to the curves showing the maximum air inlet temperatures for various vacuums, said that the curves had too much curvature and should more nearly approximate diagonal lines. Although the paper gave data on three or four essentials of cooling towers, he suggested that the water losses should be stated.

H. E. Longwell said that he had assisted in the introduction of cooling towers in this country, as he had helped make the drawings for the first one. Cooling towers have been on a scientific basis for the past 10 years and since their inception have progressed far beyond the rudimentary stage. He did not think that excessive cost or lack of knowledge had restricted the use of the cooling tower, but attributed it to the fact that Nature had been better to this country than she was to the European countries.

B. H. Coffey criticised the presentation of the weather conditions, as only the readings for 8 a.m. and 8 p.m. were given, while he thought average readings would be much better. As from 75 to 85 per cent. of the cooling was due to evaporation, he considered the form of cooling surface important.

C. G. de Laval expressed the opinion that the cooling tower and the condenser should not be discussed separately but rather in conjunction. The high cost that the author stated was one of the obstacles to the use of cooling towers he considered due to the specification of unsuitable conditions, or to the fact that all conditions, such as the time and duration of the maximum load, was not given, particularly as the last two might alter the size of the tower.

E. B. Dreyfus said that the efficiency of the tower did not depend on the ratio of the volumes of water and steam, but upon the effectiveness of the air withdrawal. F. J. Bryant cited the case of a tower installed with a siphon condenser where the water from the condenser flowed into a tank and was then pumped over the tower. Here water in the steam replaced the cooling water lost by evaporation and the water at the base of the tower was about 10 degrees cooler than the atmosphere.

Mr. Bibbins in closing the discussion stated that the free fall of water was to be avoided only in the high duty tower. The loss of water by windage occurs in any tower and he considered it of great advantage in the natural draft type.

The third paper presented was

Governing Rolling Mill Engines.

BY W. P. CAINE, ENSLEY, ALA.

Rolling mill engines are of two general types, twin reversing for the two-high mills and tandem compound for the three-high class. When a piece strikes the rolls in the latter type the engine slows down under the impact. At the instant the piece leaves the rolls the engine may be receiving the maximum amount of steam and the speed consequently rises. It is this, in the author's opinion, that causes nearly all the failures of rolling mill engine flywheels. Tests made on an engine driving the four-pass roughing rolls at the Ensley plant of the Tennessee Coal, Iron & Railroad Company showed that the addition of an adjusting screw prevented the governor from dropping and allowing the maximum amount of steam to reach the cylinders, while at the same time the engine would not stall under a heavy load. In this way the increase above normal speed after the passes was reduced from 11 to 7 rev. per min. and the speed variation during the no-load period cut in half.

Richard H. Rice presented the paper in the author's absence, and at the conclusion of the reading the secretary read a contributed discussion from Henry C. Ord, which stated that the conservation of energy in rolling mills had received little attention until the last five or six years. The power required was not known until the continuous indicator and the recording tachometer came into use, as the cards from these instruments furnished records from which conditions for any stage of the operation could be calculated and gave information on the variation in speed and power for different classes of work.

Another contributed discussion from James H. Tribe stated that the reason for installing the large engines criticised by the author was to prevent stalling when the ingot was gripped and to check the increase in speed when it was released, and the effect of these two operations upon the engine was the same whether the engine was reversible or ran continuously in one direction. He regarded the adoption of electrically driven two-high rolls as the best solution of the problem of economy.

The next paper:

An Experience with Leaky Vertical Fire Tube Boilers.

BY F. W. DEAN, BOSTON, MASS.

Two boilers built in accordance with the designs of the author after about two weeks began to leak at the lower ends of a number of tubes. Expanding the tubes and welding on new ends were both tried, but failed to remedy the trouble. The brand of coal used was also changed without result. As a last resort the firebox was lengthened and the boiler raised by that amount. The first boiler was altered and started 16 months ago and the other was operated for the first time after alteration in February of this year. Since these alterations have been completed neither of the boilers have leaked and no hard incrustations have formed at the lower ends of the tubes due to molten earthy matter being injected by the draft against the tubes and tube plate and

congealing there by the relatively low temperature of the metal. With the boilers as designed at first this incrustation was so hard that it had to be removed with a chisel, while in the new design it is light, brittle and readily crushed and removed by a tube blower in the smokebox. From this experience it would appear that the leakage was a result of this incrustation.

This paper was read by the author, and the secretary followed with a contributed discussion from A. Bement, which dealt with two similar cases, and the remedies used. In the first, two drums were mounted one above and one below the boiler and connected to permit the circulation of water and steam. The gases in the fuel passed between the connecting tubes, and in this way lost much of their heat. The other case, that of a house heating boiler, was remedied by cleaning the end of the boiler and coating with asbestos cement.

R. P. Bolton was of the opinion that the trouble was caused by a faulty design that invited trouble, as the tubes were too large and the last 5 ft. did practically no work at all. This last was the principal cause of the leaks at the tube ends and the low efficiency.

Wm. Kent cited a case where a large diameter boiler had been designed without any provision for cleaning the dirt from the crown sheet. J. C. Parker did not consider the design so bad, and attributed the trouble to the chain grate not being completely covered and insufficient provision for carrying off the gases with rapidity and little friction. The temperature to which the tubes were subjected was too high, and he did not believe they leaked before becoming clogged.

O. C. Woolson said that perfect combustion should take place before the tubes were reached, and should be completed under a properly constructed arch. A properly designed combustion chamber would have eliminated all trouble. A. A. Cary cited cases where leaky boilers had been remedied by increasing the combustion chambers. Fire brick piled on edge under the boiler so that the gases passed through the openings and gave uniform heat had also been used. L. P. Breckenridge said that the point of highest temperature was not always directly over the fire but depended upon the rate of evolution of the gases and the volatile content of the fuel.

Col. E. D. Meier thought the trouble was due to a cumulative effect of a number of causes. The deposit on the tubes was chiefly unburned carbon.

J. C. Parker spoke again at this point, and agreed that the highest hot point was variable, but thought that such a condition represented poor firing. In one case that he knew of the flue temperature had gone up for half an hour after firing, while the fire burnt down to ashes. A. M. Greene, Jr., and D. M. Meyer contributed to the discussion.

Mr. Dean, in closing, said that as there were a number of vertical boilers which had the fire nearer the crown sheet than in the ones described in his paper he did not think that was the cause of the trouble, as all these had given satisfactory service.

The last paper of the session was

The Best Form of Longitudinal Joint for Boilers.

BY F. W. DEAN, BOSTON, MASS.

For a number of years in this country the best form of longitudinal butt riveted joint for boilers was generally considered as that in which the inside strap is wider than the outside, and has one or more rows of rivets which pass through the shell and the inside strap beyond each edge of the outside strap. Although so far as the author is aware there has been no case where a boiler jointed in this manner has exploded, there was one case where a longitudinal rupture occurred within the limit of the joint, and only the rapid reduction of steam pressure averted an explosion. With this in mind the writer has adopted a joint in which both straps are of the same width. This places all the rivets in double shear and takes care of all strains.

The author on account of the lateness of the hour merely presented a brief abstract of the paper, and R. P. Bolton opened the discussion by stating that this form of joint had been tested in 1858 and possessed the vital defect of having long distances between the rivets for caulking. In his opinion the ends of the boiler plates were the weak point of the joint. Carl G. Barth described a cylinder of 72-in. diameter intended to withstand a pressure of 400 lb., which he had designed for creosoting railroad ties, and illustrated the design by means of lantern slides.

Colonel E. D. Meier said that a welded joint would be ideal if it could be tested, but at the present time he believed that a well riveted joint was as near perfect as it was possible to secure. The butt straps should be rolled to conform to the curve of the boiler plates by passing them through the same rolls as those used to form the plates. A. M. Greene, Jr., mentioned the fact that in 1893 boilers designed with the Dean type of joint were installed by the United States Navy Department in the cruisers New York, Columbia and Minneapolis, and had given very satisfactory service, although unequal straps were used on locomotive boilers.

Gas Power Section.

While the general section, considering matters of interest to steam engineers, was in progress in the auditorium, the gas power section convened in the lecture hall on the sixth floor of the Engineering Societies Building. The chairman, F. R. Low, opened the meeting with an address covering the work of the various committees during the year and giving a general résumé of the progress of the year in gas power work.

Chairman Low's Address.

The work of the section for this, the second year of its organized existence, has been largely formative. The art to develop and to chronicle the development of which is our avowed purpose, is so recent even in its beginnings, so new in weighty accomplishment, that it is possible for an organization with our facilities to gather and put upon permanent record the main facts of its history and its precedents and data evolved in its development. Our endeavor should be to do this in such a way that another generation will have no regret based upon the failure of ours to make a full and intelligent use of its opportunities.

The Standardization Committee has presented a preliminary report dealing with the significance of various terms used in the art. While nothing that we can do or say will endow any of these terms or quantities with an arbitrary measure or value, your treatment and disposition of the report will go far toward determining the future usage upon which legal and other interpretations will be based.

The Committee on Literature is organizing so as to provide for the systematic reading of current gas power literature, and the filing of index and reference cards with the librarian to the end that future searchers may find the directions to available information grouped for ready reference, and the information itself either in the files or elsewhere in the library. This is not retroactive, however, and some steps should be taken, while present but perishable information is available, to put upon record the history of the art, to make up its complete bibliography, a roster of its personnel and a chronological statement of its achievements, to write the subject of gas power down to date as Professor Dalby has written that of heat transmission, and I recommend that a subcommittee be created for this purpose.

The Installation and Plant Operations committees have been occupied in perfecting systems, and the forms submitted for your consideration are parts of such systems, which are thought to co-ordinate with and to supplement each other, and to fulfill all the purposes of the section. The work of collecting information along these lines will be vigorously prosecuted during the coming year, and any suggestions which will improve the efficiency or practicability of the system will be of especial value at the outset of the work. A number of laboratories are available for research work, and the section is asked to suggest lines of experimentation.

The results of the Meetings Committee work are before you in the papers which have been presented at this and the other meetings of the year.

The membership of the society has increased during the year from 247 to 378, a gain of 50 per cent.

The development of the past year has been steady along lines already laid down at its commencement, rather than productive of new lines of thought or endeavor. I do not know that the record of the past has been surpassed either in magnitude of unit produced or in efficiency of performance. There has been some difficulty in the production of

large cylinders which would maintain their integrity under the extreme conditions of pressure and temperature, which obtain when the entire process of conversion from the potential energy of the fuel to the energy of a revolving loaded shaft is conducted within the cylinder itself, and a metal which can be cast and having such strength as to withstand this pressure in thicknesses which will allow the walls to be effectually jacketed is a desideratum. Cast steel has gone far toward solving the problem. An alternative is a modification of design which shall permit the use of wrought metals.

E. T. Adams said early in the year that looking forward we were nearer a 10,000-hp. unit than to a 5000-hp. unit looking backward. He has designed a station of 100,000-kw. capacity, which with 500-kw. units will take no more space than a station of equal capacity with 14,000-kw. turbines, and we hope to have the particulars of the design for an early meeting.

In northern latitudes where heating is an important factor, or in factories where large amounts of heat are used in manufacturing processes, the internal combustion engine is handicapped by the fact that its efficiency is surpassed by that of the steam engine when the latter is credited with its rejected heat available for such uses. The rejected heat of the gas engine, less than that of the steam engine, by reason of its greater efficiency, is still some 75 per cent. of that supplied to it. A large amount of this heat comes out in the jacket water at a temperature of about 140 to 180 degrees; the rest in the exhaust gases at a temperature of about 1500 degrees.

A practical method of applying this heat to useful purposes will greatly increase the field of the internal combustion engine. A number of engineers are at work upon the problem. One manufacturer passes such gases through conduits beneath the cement floor of his shop, maintaining the room at a comfortable temperature. Another uses the exhaust gases to make steam from the already heated jacket water, supplementing them when necessary by burning gases from the producer beneath the boiler. He labors under the disadvantage that the returns from the heating and process systems are not cool enough to go into the jacket and make the process a closed heat circuit. Unless very large volume could be circulated at small temperature difference.

The year has witnessed continued and new attempts at a gas turbine, with no results about which we can talk in detail. Hans Holzworth, one of whose steam turbines was exhibited at the St. Louis Exposition, has exhibited a small gas turbine which ran so satisfactorily that he had no trouble in obtaining capital for the building of a 100-hp. unit, upon which he is now engaged at Berlin. Mr. Warren, one of our New York members, is obtaining some very interesting results in his efforts to construct a Hero turbine, Avery engine, or Barker's mill operated by gasoline.

The difficulty in the gas turbine is, of course, to find materials which can deal at the same time with pressures and temperatures, both high. In view of the remarkable results obtained by the addition of low pressure steam turbines to reciprocating engines the conception of a gas turbine in series with a reciprocating gas engine naturally arises. The terminal pressure and temperature in a gas engine are high. There is considerable energy to be had by expanding the gas to temperatures attainable, even under atmospheric pressures. At the same time these gases are not so hot when they come from the engine that they cannot be readily worked in nozzles of easily procurable material. It would be interesting to see this adaptation worked out, at least on paper.

Notwithstanding the attractiveness of the two-stroke cycle, the smaller weight of engine required, &c., no progress has been made during the past year except upon engines of the smaller sizes, and we appear to be no nearer to the wider use of the two-cycle engine in large sizes than we were two years ago.

The movement toward the better use of by-product gases goes on. All the large iron and steel works use their blast furnace gases in gas driven blowing engines, pumps and electric generators, and coke manufacturers are putting in by-product ovens. It is said that German interests will erect a by-product plant near South Bethlehem, which involves an investment of some $4,000,000 to furnish coke to the Bethlehem Steel Company, and will have available some 24,000,000 cu. ft. of gas per day of a thermal value of 400 B.t.u. At 10,000 B.t.u. per horse power this amounts to 40,000 hp.

Efforts toward a producer which will satisfactorily and continuously handle the more abundant and cheaper bituminous coals without extensive auxiliary cleaning apparatus continue, and if reported performances hold good the year may be credited with notable progress in this direction.

Increasing interest is being taken in the use of substitutes for coal and oil. Numerous peat bogs are being worked, and both peat and lignite are successfully used in producers. This is especially true of Western lignite. Occasional references are made to the possibilities of using town waste in the same way, but we have not learned of any notable progress in this direction during the year, and it is still a question whether the vast amount of carbonaceous rejecta of our large cities can best be made to contribute to our fund of available energy by way of the producer or of the still.

The United States Geological Survey has just issued a bulletin, bringing the question of alcohol as a fuel down to date. Burned in engines especially constructed for it, Strong and Fernald, the authors, say that a gallon of alcohol will develop as much power as a gallon of gasoline, notwithstanding it has but 71,900 heat units per gallon, as against 115,800 for gasoline. The present price of denatured alcohol is 50 cents per gallon in 5 and 10 gallon lots, more than twice that of gasoline, but untrammeled by an internal revenue tax it would doubtless be a serious competitor for the latter fuel.

The usefulness of the gas engine in marine work was considered by C. L. Straub in his paper presented to the section at the Washington meeting. Rumors persist to the effect that a sizable war vessel is being built in Great Britain to be propelled by internal combustion motors, and we understand that a contract has been awarded for a 1000-hp. outfit for one of our lake steamers. The canalboat work in Germany is already past history.

In conclusion I wish to express my appreciation of the work which has been done by the members of the various committees, and to bespeak for my successor the same interested and enthusiastic endeavor which has made my own incumbency of the chair so pleasant and its duties so light.

The report of the tellers of election of officers for the section was then submitted by Prof. W. Rautenstrauch, which announced the election as chairman of J. R. Bibbins, and as member of the Executive Committee the retiring chairman Fred R. Low. The present secretary, Geo. A. Orrok, was re-elected by the Executive Committee previous to the meeting.

A report by the Committee on Plant Operations was presented by J. B. Andrews, covering much the same ground as that presented before the main session Wednesday morning.

Chairman Low supplemented the paper with the request for suggestions as to how the form for reports might be improved.

T. H. Parker stated that what he would like from the section is reports of what is going on. He believes that internal combustion engines are the right prime movers, but when more profitable a boiler should be installed. He does not believe in being tied up to one idea, and would like to see the volume of matter published condensed so as to be in useful shape for outsiders. J. N. Norris thought the committee had covered the matters very ably and fully. He moved the adoption of the committee's report, which motion was seconded by H. H. Suplee, who at the same time mentioned the experience the society had in devising standard boiler codes. It started with the first proposed form, and devoloped it as occasion indicated. The report was adopted. Mr. Suplee then moved a vote of thanks to the committee for its work, which was carried. The work of the committee is to be continued during the coming year.

The report for the Literature Committee was submitted by Prof. C. H. Benjamin. In the absence of material for a written report a verbal report of progress was given, outlining the work as at present being accomplished and to be accomplished—namely, the reviewing of books and articles, preparing an index of matter in this and other languages, presenting abstracts from time to time, and printing the committee's work in the society's *Journal*. He hoped to arrange for having all periodicals covered, and seconded the chairman's suggestion that the section preserve a history of its progress. Professor Rautenstrauch, one of the members of the committee, then gave his idea of how the committee work should be done.

On behalf of the Installations Committee L. B. Lent spoke for Chairman Bibbins, indicating what results were accomplished by this committee during the year.

The section then gave its attention to the two papers which were prepared for presentation. On behalf of the author, Prof. W. H. M. Goss presented an abstract of the first.

Testing Suction Gas Producers with a Koerting Ejector.

BY C. M. GARLAND AND A. P. KRATZ, URBANA, ILL.

A new method of testing suction gas producers and forms of computation that have greatly reduced the labor of

running the tests and making the calculations is presented in this paper. This method and the forms were given a trial at the University of Illinois by the writers. The plants as installed consisted of a producer, the wet scrubber, the gas receiver and an engine. To facilitate the test the connection to the engine was blanked and a Scutte-Koerting steam ejector connected to the gas main to draw the gas from the producer and deliver it to the scrubber. The amount of coal used was ascertained by filling the producer when cold and taking the average weight; in this way the error of filling was reduced to about 2 or 3 per cent. The volume of gas generated was measured by meters and checked by computing the amount theoretically generated from anaylses of gas and coal. With anthracite where the loss of carbon in the form of soot and tar probably does not exceed 1 per cent. this is an excellent method of checking, but where large bituminous producers are tested the carbon lost in soot and tar is estimated from samples and this amount deducted from the total weight of carbon in the coal. The volume of gas may then be calculated within 5 per cent., provided the sampling is accurate. The tendency of the ash to pack in the fuel bed does not, it is believed, materially affect the determination of the weight of coal fired, and is principally valuable for ascertaining how much unburned carbon is lost through the grate.

R. H. Fernald, discussing C. M. Garland's paper, considered the methods of testing gas producers presented very interesting. He emphasized the fact that gas producers cannot be tested like steam boilers independently of the engines they supply on account of the prejudice which has existed against the gas producer and gas engine. Therefore in all the government tests an engine has been operated by the gas produced. This was particularly necessary owing to the large variety of fuels tested and the variation in quality of gas produced. He stated, however, that from the producer's standpoint alone the engine is not essential, and Mr. Garland's method is ingenious and reasonably convenient. The speaker also asked for further information concerning the details of the methods employed by Mr. Garland in determining the quantity of steam used by the gas producers, and described the methods used at St. Louis.

Another question of accuracy on the author's paper was the statement "that the volume of gas may be computed from the analyses of the gas and coal, and that this may be relied upon within 5 per cent., providing the sampling is accurate." The speaker emphasized the fact that proper sampling is difficult to secure. Concluding, the speaker declared that the investigations carried on by Mr. Garland are unusually interesting and of great value, and that the gas power section is to be congratulated upon securing the valuable records presented in the paper.

The paper was also discussed by J. M. Tate, Jr. He brought up an additional point that a run should be made two or three days after starting the producer, as a test with a new fire gives poor results. Mr. Suplee mentioned the unreliability of orifices to determine the volume of gas passed. The results vary excessively even when the conditions are kept as nearly constant as possible. Mr. Lent wanted to know if the performance of this producer was unusual in practice for large sizes.

H. S. Smith remarked that the paper gave evidence that the conditions were not the same at the end as at the beginning of the test. In this and other tests it appears that the efficiency is almost the same over ranges from 20 to 120 per cent. load.

W. B. Chapman answered concerning the amount of coal burned per square foot of grate area, that 10 lb. seems to be best with our fuel, although much larger quantities are reported from abroad. Professor Fernald stated that when burning lignite an average of 33 lb. has been burned in 16-hour runs and 48 lb. in eight-hour runs. C. N. Trump remarked that the rate of combustion in anthracite producers depends on the size of the coal; 8½ lb. for buckwheat is a pretty good figure; 44 lb. has been burned per hour in Mond producers in continuous work. The speaker had also noticed that Venturi meters gave more accurate results in the measurements of both gas and steam than orifices.

The second paper of the session was presented by its author, the newly elected chairman.

Bituminous Gas Producers.

BY J. R. BIBBINS, NEW YORK.

The perfecting of the bituminous producer has proved a difficult problem, but marked improvements have been made during the last two or three years. Prior to that there was considerable activity resembling plagiarism in this field, with inevitable failure as its result, most of which might have been avoided by an investigation sufficiently comprehensive to secure an accurate interpretation. Selection and operation of a plant frequently in accordance with the personal prejudice of the engineer make results impossible which might easily be attained under proper conditions. If it were possible to alter the ratio of air to gas in the mixture admitted to the engine in accordance with the variation in the heat value of the gas, maximum efficiency could be secured. This factor, however, has received no attention, and consequently producer operators have been working in the dark. The production of tar-free gas has also been demonstrated in the double zone type of producer tested by the author for about 18 months and the end, even at the expense of heat value, justified the means. Green gas possesses a somewhat higher heat value than the tar-free variety, and this feature might become a factor in rating where engines are designed with little or no margin; but good practice recognizes no difference between gases having slight variations in the number of British thermal units contained, and there is therefore no obstacle in the way of the development of tar-free gas producers in any form. Further investigations are needed regarding the possibility of large producers, as at the present time the small size, together with the consequent multiplicity of units, is a serious handicap to their use with large installations of turbines and boilers.

Mr. Tate believes this paper in line with what all are working for high British thermal unit values from the gas producer. He confirmed the experience of Mr. Bibbins with the same fuel with a wide range of constant efficiency over varying loads. A written discussion by Professor Fernald was in substance as follows:

A producer that will operate continuously for 365 days is a splendid commercial proposition from a financial viewpoint, but the requirements outlined impose conditions which are higher than those of steam plants and beyond practical requirements. Any variety and grade of recognized fuel can be handled with more or less success in any producer without any change in design, but it would probably be better to use one type of producer for certain fuels and another plant of modified design for another range.

Exception was taken to the impression conveyed by the closing paragraph of the paper that producer units are small as compared with boilers. The reverse was true, he declared, as in Europe large units are common, and are increasing in the United States.

To keep the cost of the power developed down to a consistent figure, all grades of coal and other fuels should be used especially low grade coal, lignite and peat, which demands the concentration of large power units in the immediate vicinity of the fuel supply.

W. B. Chapman declared that the author deserves credit for an able paper and one conservative in regard to bituminous producer problems being solved. He added what he considers some of the requirements of a successful gas producer. Back of preventing of clinker formation is the prevention of blowholes, as it is the blowholes that produce clinkers usually. It is not the average heat of the producer, but the excessively hot spots, that produce clinkers. He has found that slight agitation, not necessarily stirring, prevents clinker. He declared also that the temperature should be the same across any horizontal plane of the gas producer. To get uniform density and temperature he believes that it is necessary to get some form of mechanical agitation. Producers should be able to be made in a variety of sizes. Producers should not necessitate a balanced draft, as this is difficult to obtain.

E. I. Leighton believes that future developments will be largely in the line of bituminous coal producers.

In New England, for instance, anthracite is not sufficiently easily obtainable. Continuous operation has not been generally possible and it would certainly be a great step in advance to be able to run without interruption. Mr. Suplee cited gas furnaces as gas producers that are run for years continuously. He does not think, however, that long runs are absolutely necessary. It is seldom that we want to run any engine that way. He spoke of the Stitson producer, which is one with an inclined grate that prevents clinker by keeping the ash in motion. The point to be considered is the value of the thermal charge delivered to the engine. Mr. Trump thought that it should be remembered that making tar-tree gas destroys a valuable by-product. For example, it loses sulphate of ammonia, which if recovered would largely pay for the fuel.

H. E. Longwell offered Mr. Tate a slight explanation as to why we have different efficiencies with different qualities of fuel. The capacity of a producer is very indeterminate. It is an arbitrary rating as a rule. He believes that a good many producers are run at too high a rating. With lignite the water in it is sort of an internal jacket, which accounts for the low temperature at which the gas is delivered. There is not so much in the design of producers as in the method of handling them.

Mr. Smith gave it as his opinion that while it is of advantage to run continuously that that is not what is desired so much as to be able to start and stop easily. There is some difficulty in obtaining uniform draft through two fuel beds with one outlet, which he thought might be a disadvantage of a double zone type of gas producer. With regard to the obtaining of entirely tar-free gas, he mentioned that some times producers have run one, two or three years without any trouble, but in time there was trouble when their own men did not operate them. This was when running on Texas lignite.

In closing the discussion of the paper, the author modified somewhat the impression gained as to what he meant by continuous operation. He did not mean to imply that the producer should run absolutely continuously day and night, year in year out, but that it should be equal to daily runs without necessity of shut down in working hours. He also explained the functions of the balanced valves in double zone producers, which is to keep the draft in the two fuel beds uniform.

The section had expected to consider the report of the Standardization Committee, but inasmuch as the hour was so late this was omitted.

Chairman Low turned the chair over to the newly elected chairman, Mr. Bibbins, and the latter in a few well chosen words indicated his intention of throwing himself heartily into the work, and also urged greater endeavor from the members, inasmuch as it is impossible for the officers and committees to do all of the work. He urged the importance of the papers presented before the section, and that each member when he encounters a problem or the best solution of it, or some new development, should see that it is brought before the section. It is only by such co-operation that the society's publications can record the progress made.

FOURTH SESSION.

The last professional session of the meeting convened in the sixth floor lecture room to consider four papers on miscellaneous subjects. The first was

The Bucyrus Locomotive Pile Driver.

BY WALTER FERRIS, SOUTH MILWAUKEE, WIS.

The machine described in this paper is especially interesting from an engineering standpoint on account of the self-propelling mechanism and the self-contained hydraulic turntable. Originally this pile driver was designed to meet the requirements of the Santa Fé system for a pile driver capable of climbing grades and hauling its supplies instead of requiring the constant attendance of a locomotive with the expense incident thereto. Inclined shafts are used to transmit the power from the gear on the crank shaft of the engine to the trucks and speed variation is obtained through a sliding gear on the engine shaft. Should it be desirable to ship the machine in a freight train the propelling gears can easily be disconnected. The boilers are larger than those generally found on a pile driver and are designed for 175 lb. pressure. This is only used to propel the car, as the ordinary movements of the machine can be made with 100 lb. pressure. The machine can reach piles 19 ft. on each side of the track, and if the turntable is used to lift the car off the track and turn it at right angles to the right of way, 32 ft. on each side can be covered. When it is desired to turn the car either half or all the way round, it is only necessary to put chair castings under the jack screws and run the latter down until they touch the chairs. The entire car is then raised by filling the hydraulic cylinders with water and turned by operating the cranks provided for this purpose.

This paper was presented by the author and written discussions from A. F. Robinson and L. J. Hotchkiss were read. The former who is bridge engineer of the Atchison, Topeka & Santa Fé Railway system expressed satisfaction with the use of this pile driver. This road now has three equipped with the extra high speed gear, and has found that they save time over the locomotive, especially in the short moves required in spotting the pile for driving, and also in the short run back to the end of a bridge to obtain piles. Mr. Robinson believes that when the machine is thoroughly understood a great many of them will be used, especially when reinforced concrete piling is used more extensively. Mr. Hotchkiss, assistant bridge engineer of the Chicago, Burlington & Quincy Railroad, compared older forms of pile driver with the self-propelling one which saves time and the service of a locomotive, and because it performs its work so much quicker, piles can be driven between trains where otherwise it would be impossible.

O. K. Harlan asked about the cost of the machine, and in reply the author stated that this figure varied from a basic price of $11,650 without the turntable or steam hammer, to $14,000 for a complete outfit, including the turntable and hammer, and an electric lighting plant. The second paper

Line Shaft Efficiency, Mechanical and Economic.

BY HENRY HESS, PHILADELPHIA.

The power lost in a complete power transmission system is consumed in the work of bending and slipping the belts and overcoming journal friction. The power consumed in the first two is only a small part of the loss, and cannot be reduced to any great extent; in the average plant the last is the source of 90 per cent. or even more of the line shaft losses. The coefficient of bearing friction varies from ½ to 8 per cent., but may be materially reduced by the substitution of ball bearings for the plain type, provided sizes suitable to the load carried be chosen. It is the economic question that is the more important in the case of line shafting, and the question to be settled is whether the saving effected will pay for the increased cost of the ball bearing installation and at what rate. As there is practically no definite information on this subject the author decided to make a series of comparative tests in which the only variable quantity should be the bearings themselves. The saving in power shown by this test amounted to from 3.5 to 21 per cent. when ball bearings were used on the line shaft only and double these figures when both line and countershafts were so equipped.

T. F. Salter, chief engineer of the Standard Roller Bearing Company, regarded the paper valuable for giving data as to the saving to be expected in specific installations, such data heretofore being meager. He cited a few of many instances where roller bearings have been used with success in shaft hangers and described briefly some applications of ball and roller bearings to general machine construction.

Geo. N. Van Derhoef questioned the quantity of oil given by the author, which was ½ pint per day, or 18¾ gal. per year for ten 2 7-16-in. bearings, as there was no hanger on the market requiring that amount. Three gallons constituted an ample yearly allowance for that number of bearings. The item of two hours' labor per week is greatly in excess of that required even if the large amount of oil stated was used; three or four hours per year was all that he considered necessary for the number of bearings attended to.

Prof. R. C. Carpenter regarded the paper a valua-

ble contribution to our knowledge respecting the use of bearings of various types. In reference to the author's statement that the coefficient of friction of plain bearings ranged anywhere from ½ of 1 per cent. to 8 per cent., he cited a test made by him with plain roller bearings where the friction load was not constant. Because of the variability of the coefficient of friction he believes an equivalent expression should be found in terms of the friction load, which is more nearly constant. He thought that a mistake had been made in giving the same depreciation values to both the plain and ball types of bearings and thought that while 5 per cent. was a proper value for the latter, that of the former should be twice as great. C. A. Graves cited the results of tests on 200 line shafts in various industries and said that he preferred the term watts per bearing to coefficient of friction. The tests to obtain this figure were made by stopping all the machinery and the power noted to run the motor when belted to the line shaft and with the belt removed.

An additional saving with ball bearings which was not mentioned in the paper is the reduction in the size of the motor required to drive the shaft.

O. K. Harlan inquired which type of bearing is better, a ball or a roller bearing, and asked what is the outlook for their use in railroad service. They effect a saving of motive power, and have also been used on side bearings to reduce the friction due to curving, but he wished to know whether the saving in this case had been due to a saving in the amount of motive power required to move the same load or an increase in the load moved by the same motive power. One thing that in his judgment prevented the adoption of this type more generally was the cost and the multiplicity of parts. C. J. H. Woodbury inquired whether the coefficients of friction given by the author had been derived from the results of the tests or from other sources. The question of the lubrication of bearings was a complicated problem in his opinion. Walter Ferris spoke about the use of ball and roller bearings in railroad service, and said that the coefficients were extremely low, journal friction being between one-quarter and one-half of 1 per cent. This saving in the amount of friction must be balanced against high first cost, a complication of parts, and delay in making repairs.

F. J. Miller thought that some provision should be included in the paper, so that the results of the tests could be made applicable to any bearing, as only a special type was used in making the test. A. C. Jackson considered that the roller bearing possesses certain practical advantages over the plain type, such as an increased rate of speed with a resultant lessening in the size and weight of both the shaft and pulleys. C. D. Parker conceded the value of the ball bearing, but considered that a general application of this type was barred on account of the excessive cost. The paper was valuable, as it had brought the question of cost to the front, and in conclusion he asked whether the high first cost was due to the mechanical or commercial features of the bearing.

O. B. Zimmerman asked if the question of equipping all the countershafts with ball bearings had been taken into consideration, and also the return upon the investment. Another point he raised was whether by equipping the line shaft with ball bearings it would be possible to substitute 90-ft. shafts for 60-ft. shafts.

Mr. Hess in closing said that the percentage of saving could not be stated unless the actual amount of power saved and all the other conditions were known. A peculiar feature of the tests was the effect which the time of test had upon the results obtained. This he attributed to a variation in the amount of elasticity of the belt. The author took exception to Professor Carpenter's remark that the coefficient of friction might be expressed as a percentage of the friction load. In his opinion the size, type and location of the bearing, together with the kind and quantity of the lubricant, all entered into the problem to such an extent that the friction load could not be taken as a measure.

The third paper was

Pump Valves and Valve Areas.

BY A. F. NAGLE, SOUTH BETHLEHEM, PA.

The writer regards it poor practice to proportion the area of water works pumping engine valves to the plunger area because there is no distinction made between the valve seat and the circumferential area of the valve at any lift, either assumed or specified; and also because it leads to absurdities unless coupled with the length of stroke and the number. Where two pumps have precisely the same amount of water passing through them per minute, but the plunger area is in the proportion of 2 to 1, the valve area according to practice should be four times the other. Assuming that valve area means valve seat area, the spring becomes the most important part of the valve, and the point to be determined is the strength of spring that will permit prompt closing of the valve with the expenditure of only a small percentage of the total pressure of the pump for opening. The pressure of the spring per square inch of the inside seat area is the force that causes the rate of flow of water through the valve, and this is the proper place to look for the loss of head desired by designers and operators of pumping engines. The largest and weakest castings of a pumping engine are the valve chambers, and following the spring tension theory would reduce the diameter of these chambers by possibly 10 per cent. and possibly a saving of over 30 per cent. in the number of valves required will also be effected. Springs should be of oil tempered steel protected against corrosion by electroplating them with copper and tested to insure the same amount of tension in all those intended to perform the same amount and kind of work. This improvement should result in a slightly better pumping engine at a little smaller cost.

This paper was presented in abstract by the author and a contributed discussion was then read from C. A. Hague. The relation between the plunger area and the valve area he declared merely an incident, becoming less and less frequently observed, and he hopes will finally be disregarded altogether. The real matter of importance, he affirmed, is the velocity with which the water must pass through the valve seats to result as nearly as possible in the complete filling of the plunger chamber. The area should depend on the velocity needed to pass the required quantity in a given time. The area of the passage around the unseated valve is relatively unimportant. Excessive lift makes trouble. No pump should have its valves free to lift to an unchecked hight; slamming occurs at reversal of the plunger. He recommended 3 ft. a second as the proper average velocity through the valve seats during the stroke. Other considerations he cited were that the water have as direct lines of flow through the pump as possible, avoidance of reverse currents and places for air to lodge.

In another contributed discussion F. W. Salmon suggested that instead of using the radial ribs of the valve seat to screw it in place small projections be cast on the outside, of such a size that an ordinary pipe will fit when the end is milled, thus forming a socket wrench. He prefers a brass plate on the top of the rubber valve and punches out and turns up little projections which keep the spring from wearing the top surface of the valve and properly centered. A small cast projection on the under side of the spring guard is found desirable by the writer, so that if the valve should ever be lifted so high as to come in contact with these it will descend freely and not stick, as might be the case if the surface of the spring guard were smooth.

Irving H. Reynolds also contributed a written discussion which dealt with the simple disk valve used in American pumping engine practice. With reference to the two common errors met with in specifications for pumping machinery mentioned by the author, he believed that there is a tendency to specify the maximum velocity of flow through the valves as suggested by Mr. Nagle rather than the ratio between valve and plunger area. Quietness of operation is the first consideration in pump design rather than cost, and as a result large valves are being used. Time is an impor-

tant element, and therefore the number of valve seatings rather than the piston speed is an important factor. Consequently small valves with relatively low lift have displaced the large diameter valves commonly used a few years ago. To further decrease the lift and permit quick and quiet closing at high speeds valve areas have been increased to a point where in actual operation they lift only a fraction of the theoretical hight they should to give full opening. If high speed pumps were equipped with light springs as suggested by Mr. Nagle the pumps would probably be noisy as the valves would be so far from their seats at the reversal of the plunger that they would not seat until the flow was reversed, and this trouble would be aggravated by the use of light springs. There is no doubt that in many cases springs are too stiff, and on slow speed pumps lighter springs would be satisfactory.

William Kent hoped that the paper would be supplemented by tables giving proportions of valves and springs. He also wanted information on the proportions and lifts of springs for valves, and thought that a table of these should be included in the paper. The speed and plunger area should be included in the specifications. A. B. Carhart considered the spring as the main point, but did not think that springs and lifts were capable of change, as suggested by the author. The prompt seating of the valves is an essential feature. The deterioration of the valves is caused by the seating and not by the opening. The method of protecting the springs by electroplating was open to question on account of galvanic action being set up by water having acid or alkaline reactions with the plating materials. Better protection could be secured by oxidization by heat and oil baths, the degree and character to be determined by the engineer.

Professor Carpenter thought that the difficulty in closing was due to the spring and a perfect spring would cause this to disappear. The question of what was to be done is left by the author to the engineer and he thought that some mention of the remedies should be made. In closing the author stated that the velocity through the valve depends upon the spring, and the specifications to-day call for velocities that require light springs.

The last paper of the session was:

A Report of Cast-Iron Test Bars.

BY A. F. NAGLE, SOUTH BETHLEHEM, PA.

Common practice heretofore with machinery and pipe castings has been to cast separate test bars, and as a proof of compliance with the provisions of the specification to subject them to transverse and tensile stresses until they broke, but the author believes that too much confidence should not be placed on the results obtained in this way as indicating the strength of the casting. This conclusion is based upon the results of tests made by him upon test bars for the Baltimore sewage pumps which showed a ratio between the transverse and tensile breaking loads of 1 to 10 in regular test bars and 1 to 10.07 with special bars. Subsequent experiments with special circular test bars showed a variation of 10 per cent. in transverse breaking loads and one of from 4 to 7 per cent. in the opposite direction in tensile loads, or a total variation of from 14 to 17 per cent. As a result of these tests he recommends that two or three transverse test bars 2 in. x 1 in. x 24 in. be poured and tested, and that a record of the deflection be kept, as this will indicate the toughness of the iron almost as well as a tensile test, and the tensile strength may be obtained by multiplying the transverse breaking load by 10. In this way a fair indication of the strength of the iron can be obtained, although possibly a better way would be to cast three round transverse bars and accept the two that agree as giving a fair sample of iron and dispense with the tensile tests. In this way there would be no loss to the purchaser's interest and a gain would ensue instead.

The author, instead of presenting his paper, added data regarding 11 tests made on round test bars cast in sets of three each, and 31 tests where the bars were cast in sets of two each.

A contributed discussion from Prof. W. B. Gregory was read, in which the results of tests made on a number of cast iron specimens 1 sq. in. in cross section and 12 in. between supports were cited to confirm the deductions of the author as to the relationship between tension and cross bending breaking loads. The statement is made by the author that the skin had no appreciable thickness, and the writer suggests rattling the castings to remove the skin and the sand adhering thereto. Specimens of round cast iron 1¼ in. in diameter and 12 in. between supports, which had not been rattled gave a mean cross breaking load of 2805 lb. and a deflection of 0.093 in., while rattled specimens of as nearly the same composition as the foundry could make gave a mean result of 3474 lb. and 0.0904 in., which shows an increase in strength as the result of rattling of 23.85 per cent. This seems to bear out the statement that rattling increases the strength by about 25 per cent., a fact which is probably due to the removal of internal stresses and a rearrangement of the particles of iron so that they are better able to resist stresses than they were before rattling. The breaking load also varies as the moment of inertia of the cross section of the specimen about the axis of gravity.

Another contributed discussion from George M. Peek confirmed the author's statement that for the strength of beams $R = \frac{3\,Pl.}{2\,bd.^2}$, where R is the modulus of rupture, P the load at the center, l the length in inches between supports, and b and b the breadth and depth, respectively, in inches, is not applicable to cast iron beams, because it assumes a neutral axis through the center, which is true only when the tensile and compression strengths are equal. He proposed a new formula developed when knowing the ratio between the tensile and compression strengths and derived it by calculus:

$$S_t = \frac{3}{8}\,\frac{(1+\sqrt{k})^2}{8k}\,\frac{Pl}{bd^2},$$

where k is the ratio between the tensile and compression strengths. This reduces to

$$S_t = \frac{Pl}{1.185bd^2},$$

when applied to the author's examples and gives results within 1.4 per cent. of the author's.

A. A. Cary said that at the present time there is too much guessing regarding the properties of cast iron, and suggested that a study of the microstructure of metals would do much toward explaining many things now regarded as phenomenal.

A resolution extending the thanks of the society to all who had contributed in any way to make the meeting an enjoyable one for the members and their guests was offered by L. D. Burlingame and carried without a dissenting vote. Following the adoption of this resolution, the meeting was declared adjourned.

EXCURSIONS.

Wednesday Morning.

The General Electric Company's Harrison Lamp Works, at Harrison, N. J., was visited through the courtesy of the general manager, George H. Morrison. The various departments were inspected, and an excellent opportunity was afforded to see all of the processes and materials utilized in the plant, which employs 2800 hands in the manufacture of 100,000 incandescent lamps per day.

The Interborough Rapid Transit Company's Fifty-ninth street central power station was visited by invitation from H. G. Stott, superintendent of motive power. The engine room contains nine 42 x 86 x 60 in. double horizontal vertical Corliss condensing engines, two now operating high pressure, discharging into vertical type low pressure steam turbines; a third vertical low pressure turbine is now being erected. Each engine drives a 5000-kw., three-phase, 11,000-volt, 25-cycle generator. Each low pressure turbine drives a similar generator. For lighting purposes there are three 1250-kw. horizontal type steam turbines, driving 11,000-volt, three-phase, 60-cycle generators. The

boiler room contains 60 600-hp. water tube boilers. On the floor above the boilers are 20 economizers, having 152,880 sq. ft. of heating surface. Other interesting installations are 11 open type feed water heaters installed in a pipe gallery; a partly belt and partly bucket duplicate coal handling apparatus, having a capacity of 200 tons per hour, and the seven coal bunkers having a capacity of 14,000 tons.

The National Phonograph Company invited the members and guests of the society, through the courtesy of its president, Frank L. Dyer, to the Edison factories and laboratory at Orange, N. J. The visitors were met by Thomas A. Edison upon their arrival, after which the manufacture of the Edison phonographs and records was witnessed. The molding of the wax records without the aid of a core proved very interesting.

The De La Vergne Machine Company's works at the foot of East 138th street, New York City, was visited, the invitation being extended by its president, Adolf Bender. The special feature of the trip was the demonstration of a new and highly efficient type of oil engine, which has been recently perfected. It is of 85 hp., and operates on the four-cycle principle. An advantage credited to the engine is the ability of using a heavy crude oil.

Thursday Afternoon.

The New York Telephone Company, through the courtesy of E. F. Sherwood, superintendent of traffic, invited the society's members and guests to inspect the Gramercy and Stuyvesant central offices at 61 Irving place. This presented an opportunity to see in operation one of the largest central telephone stations in the world.

The Crocker-Wheeler Company's president, Dr. S. S. Wheeler, extended an invitation to visit its plant at Ampere, N. J., where various types of alternating and direct-current generators and motors were seen in all the stages of manufacture. A complete fuel gas plant which is in continual operation furnishes gas and distributes it throughout the plant for various uses for manufacturing purposes.

The Westinghouse Lamp Company, Bloomfield, N. J., was visited by invitation from the general manager, Walter Carey, where the various processes in the manufacture of incandescent lamps were witnessed. The visitors were divided into small parties for the purpose of being better instructed by the guides who were delegated for this purpose, and were afforded the opportunity of viewing the operation of the plant which produces from 40,000 to 50,000 incandescent lamps of the carbon and tungsten types per day, employing 1400 hands. The testing room is claimed to be the finest of its kind in the country.

The Henry R. Worthington Hydraulic Works, through the chief and consulting engineer of the International Steam Pump Company, William Schwanhausser, extended an invitation to visit their modern plant at Harrison, N. J. It is devoted to the manufacture of all sizes and types of pumping machinery, circulating, mine and trade pumps, condensers and water meters.

Friday Morning.

The New York Edison Company, by the courtesy of J. W. Lieb, Jr., third vice-president, extended an invitation to go through the Waterside Stations Nos. 1 and 2 on First avenue from East Thirty-eighth to Fortieth streets. Representatives of the company met the visitors and conducted them through the two stations which have a capacity of 200,000 kw. Station No. 1 contains 5 vertical turbines and 11 vertical compound turbines. The boiler plant includes 56 650-hp. water tube boilers on two floors, with longitudinal firing aisles. The firing is partly automatic and partly by hand. Forced draft is used with the hand fired boilers and natural draft with the stokers. Station No. 2 contains two horizontal and eight vertical turbines, two of the latter being of the largest capacity yet built, 14,000 kw. each. Ninety-six 650-hp. water tube boilers, each fitted with a superheater, in two tiers, constitute the steam generating outfit. Both stoker and hand fired boilers are in use, all using forced draft. The boiler feed pumps are steam turbine driven centrifugals. Small steam turbines for auxiliary drive are numerous throughout the station. All condensers are of the surface type, except one engine condenser in Station No. 1.

The Brooklyn Rapid Transit Company, through C. E. Roehl, electrical engineer of the company, invited the society's members and guests to the Williamsburgh power station, located on Kent avenue and Division street, Brooklyn, N. Y. This station being one of the best and most modern examples of the application of horizontal turbines to power generation, was of much interest. There are eight units installed, and one more to be added shortly. Four of these outfits are single flow 7500-kw. turbines; the others double flow 10,000-kw. machines. The latter are capable of developing 16,000 kw. in an emergency and are the largest horizontal turbines yet constructed. The boiler plant consists of 72 650-hp. water tube boilers set in two tiers with cross firing aisles.

Friday Afternoon.

The Astoria Light, Heat & Power Company's chief engineer, William H. Bradley, invited all those attending the Edison Waterside excursion to its Astoria plant. The party was conveyed by tug to the company's works, where they were first served with dinner and then taken on the tour of inspection. This plant is the most extensive for gas manufacturing in the world, and the visitors greatly enjoyed seeing it in all the stages of operation. The particularly interesting feature was the operation of the horizontal and inclined retorts and their charging and drawing machines. The gas condensers, exhauster scrubbers, purifiers, &c., were shown and explained, and also the coke conveyors and loaders and the coal handling machinery.

Excursions that could be taken by the members and guests at their convenience during the time of the convention were as follows:

Rockland Electric Company, at Hillburn, N. Y., where there are in operation two 500-hp. Westinghouse horizontal tandem gas engines, operating in connection with Loomis-Pettibone producers; the Singer Building tower and power plant; the Trenton Iron Company's power plant, at Trenton, N. J., which contains an Allis-Chalmers 300-kw. direct current generator directly coupled to a 500-hp. Allis-Chalmers' four-cycle tandem gas engine, obtaining its gas from a producer manufactured by R. D. Wood & Co., Philadelphia, Pa., and located something over 1000 ft. from the engine; the Watson-Stillman Company's gas engine power plant, containing a 300-hp. Riverside gas engine, operating in connection with a Tait producer; the Metropolitan Life Insurance Company's tower and power plant and the Goldschmidt Thermit Company's works in Jersey City, N. J., where welding by the thermit process was demonstrated. Other invitations were received by the society to inspect the Royden Marble Machinery Company's plant, Hewitt Motor Truck Company's shops, Keller Mechanical Engraving Company's plant, Hecker-Jones-Jewell Milling Company's plant, Swift & Co.'s gas engine plant and the Garvin Machine Company's shops.

For the entertainment of the ladies in attendance trips to the leading department and jewelry stores, visits to various hotels, automobile drives, &c., were provided. Luncheons were arranged for, and afternoon tea was served between 4 and 6 o'clock, to which the gentlemen were welcome.

Tariff Questions.

Movement to Postpone Maximum Tariff Rates.

WASHINGTON, D. C., December 14, 1909.—The reconvening of the Senate and House for the first regular session of the Sixty-first Congress has been signalized by the launching of a movement to postpone the taking effect of the maximum and minimum section of the Payne Tariff act from April 1, 1910, to January 1, 1911. The avowed purpose is to provide additional time in which to negotiate reciprocal trade arrangements with the leading countries of the world and thereby obviate the necessity for imposing the maximum rates of the new tariff on importations from any important foreign country, thus avoiding the possibility of a tariff war. The leader of this movement is Representative Mann of Illinois, an influential majority member of the House, but it can be stated on high authority that he does not speak for the Administration in this matter, and that the President and his aides neither seek a postponement of the taking effect of the maximum and minimum clause, nor fear that a tariff war will follow unless the law is changed.

The Mann Resolution.

Mr. Mann's proposition to postpone the taking effect of section 2 of the tariff act has been presented in the House in concrete form in the following joint resolution:

> That the date for applying the maximum tariff of the United States, provided in Section 2 of the act entitled "An act to provide revenue, equalize duties and encourage the industries of the United States, and for other purposes," approved August 5, 1909, be postponed from April 1, 1910, as described in said act, until January 1, 1911, and said act shall be construed and acted upon as though the word "December" was inserted in Section 2 of said act wherever the word "March" occurs in Section 2.

This resolution has been referred to the Committee on Ways and Means and Mr. Mann has given notice that he will do everything in his power to secure a favorable report thereon. There is some reason to believe that this would not be a difficult task if the President should give the measure his support. That there is little prospect of assistance from this quarter is obvious from references to the maximum and minimum clause contained in the President's annual message just submitted to Congress. In commenting upon the expressions of fear that the power conveyed and the duty imposed upon the executive to assess maximum duties in certain cases might lead to a tariff war the President expresses "the hope and belief that no such result need be anticipated." His construction of the maximum and minimum clause is regarded as one of the most important utterances of the message and is contained in the following brief paragraph:

> The discretion granted to the Executive by the terms "unduly discriminatory" is wide. In order that the maximum duty shall be charged against the imports from a country it is necessary that he shall find on the part of that country not only discriminations in its laws or the practice under them against the trade of the United States, but that the discriminations found shall be undue—that is, without good and fair reason. I conceive that this power was reposed in the President with the hope that the maximum duties might never be applied in any case, but that the power to apply them would enable the President and the State Department through friendly negotiation to secure the elimination from the laws and the practice under them of any foreign country of that which is unduly discriminatory. No one is seeking a tariff war or a condition in which the spirit of retaliation shall be aroused.

Real Object of Movement.

In view of the attitude of the administration as defined by the President there has been much curiosity as to the motive behind Representative Mann's resolution. It can be stated on high authority, however, that the measure has been brought forward as a part of the campaign which the Illinois Congressman has been conducting for several years to secure a reduction in the rates of duty on printing paper, especially that imported from Canada. Mr. Mann served as the chairman of a special committee appointed during the sixtieth Congress to investigate the paper industry, and which reported in favor of reduced duties. The reductions suggested were incorporated in the Payne bill by the Ways and Means Committee, but the Senate Finance Committee increased the rates materially and the Conference Committee adopted a so-called compromise, which, however, was but little below the Senate Committee's schedule. Soon after the new tariff act went into force an investigation by the Treasury Department developed the fact that the manipulation by Canada of certain export taxes on paper making materials justified the assessment of countervailing duties and might ultimately call for the imposition of the maximum rates provided by section 2 of the tariff act. In view of the probability that the net result of these conditions would be the levying of duties on Canadian paper approximately equal to those of the Dingley act, Mr. Mann has undertaken to postpone the taking effect of the maximum and minimum clause in the hope that Canada can be induced to enter into an arrangement by which her paper, wood pulp, &c., can be brought in at the minimum rates.

Assurances are given by the State Department that there is nothing in the situation with respect to our relations with France and Germany which threatens serious trouble, and it is believed that negotiations now on foot will result in satisfactory reciprocity agreements before the maximum and minimum clause goes into effect. Should this expectation not be realized, however, it is obvious from the President's statement regarding the proper construction of the clause that he would feel at liberty to suspend its operation until any pending negotiations should be concluded.

Functions of Tariff Board.

Much interest is felt here in the President's frank statement in his annual message that he regards the functions of the Tariff Board, created by section 2 of the Payne act, as broad enough to justify the board in making an investigation to ascertain the cost of production in this country and abroad of all the important lines of merchandise. This work, the President says, will occupy two or three years, and until it is finished he will deprecate any renewal of tariff agitation which, in his opinion, "halts business and interferes with the course of prosperity." With this declaration concerning the functions of the Tariff Board, the President asks for an annual appropriation for its maintenance, and as the whole subject of the board's activities will thus be brought before the two Houses the discussion and action thereon will be followed with great interest. Certain high protectionists in both Houses favor coupling with the appropriation a provision specifically limiting the work of the Tariff Board to the investigation of alleged discriminations against American commerce for the purpose of ascertaining whether the maximum rates provided by section 2 of the tariff act should be imposed. This was undoubtedly the purpose of the framers of the Payne law; but, in the face of the construction placed upon section 2 by the President, it is doubtful that Congress will go so far as to limit the work of a small commission placed at the President's disposal for the collection of information for his particular use. W. L. C.

The Westinghouse Machine Company, Pittsburgh, has just shipped to San Francisco one of the largest turbine engines it ever built. It is for use in the power house of the San Francisco Railways Company. Its total hp. is 22,500 and it is designed for the utmost fuel economy, having several new details in its mechanism.

The Norton Running Balance Machine.

Revolving parts must be put in perfect running balance if their bearings are to have long life and the machine is to maintain accuracy of operation, especially if the speed of rotation is great. Even at lower speeds vibration is apparent in the frames of machinery and automobiles, when there is lack of running balance. The practice of securing it has been adopted to some extent by builders of woodworking machinery, though more particularly for parts of large diameter, such as cutter heads and pulleys, where centrifugal force has an opportunity to assert itself in a conspicuous way, causing objectionable noisiness. It is only recently, however, that effort has been made to obtain this dynamic balance, as it is called, in long cylindrical forms, including shafts and spindles, for high speed metal working tools and automobiles. Need of attention to this feature exists in all types of machine tools to develop the refinement of their design, in accordance with the best practice, as any increase in the initial cost is more than offset by the final economy obtained. It should be kept in mind that static balance plays no part in this question. Running balance is required, and where this exists there is also static balance. A piece of work may be ground to run perfectly true when held in centers, but released from centers it may run out of balance owing to an unequal distribution of weight in the part as a whole. Therefore the necessity of the correction is evident.

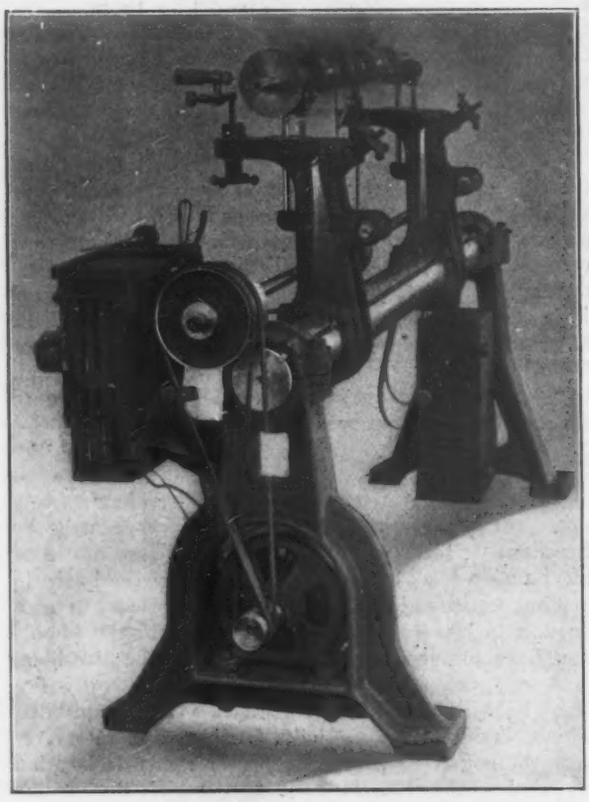


Fig. 1.—Showing a Four-Throw Crankshaft Out of Balance.

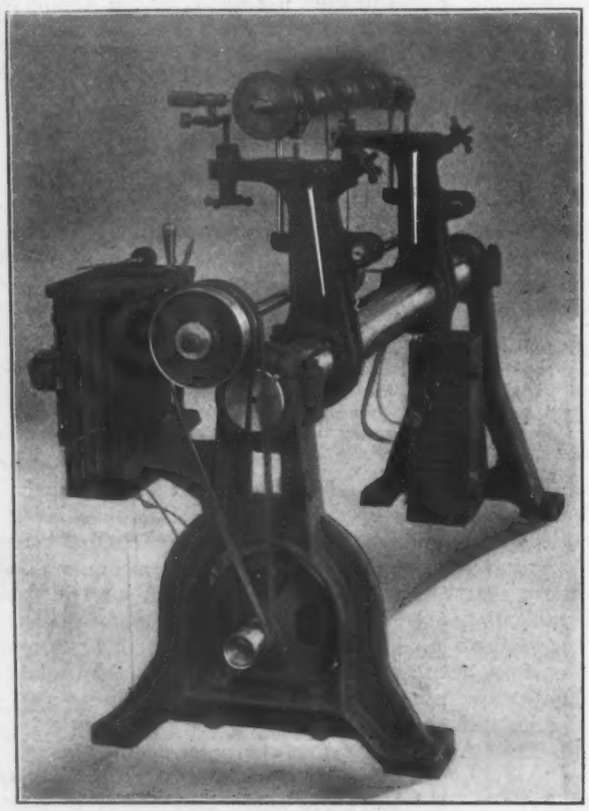


Fig. 2.—The Pointers Cease to Vibrate After the Piece Is Balanced.

A Machine for Testing Revolving Parts for Dynamic Balance Built by the Norton Grinding Company, Worcester, Mass.

The Norton Grinding Company, Worcester, Mass., has found by tests that a very large percentage of revolving parts need correction for running balance, and has developed a machine for ascertaining errors of balance, and their location, so that by the removal or addition of metal the fault can be entirely eliminated. The device is shown in the illustrations. In Fig. 1 the machine is in operation with a four-throw crankshaft rotating on the friction wheels. It will be noticed that the white pointers at the side of the uprights are vibrating, the one nearer the observer more violently than that at the rear, indicating that while both ends are out of running balance the error is greater in one than the other. Fig. 2 shows the same piece in the machine, running at the same speed, but without vibration of the pointer, the corrections having been made to give a perfect balance. Another proof of this lies in the appearance of the face of the disk at the end of the crankshaft. Before balancing the surface appears blurred because of the side motion. In Fig. 2 the tool marks stand out clearly. Fig. 3 is a six-throw crankshaft, mounted upon three uprights, so slender as not to be self-contained, requiring that test and correction be made at a third point. With increasing lengths additional heads are employed, the only limit of length being that of the horizontal cylindrical slide. Fig. 4 shows a large cylinder mounted upon its shaft ready for correction.

The machine consists of a horizontal cylindrical slide upon which are adjustably mounted and splined the uprights which carry the vibrators. The lower end of the vibrator spindle rests in a recess of the vibrator arm lever, which is pivoted in the upright, so that the vibrator can be raised and lowered by a handwheel and screw to conform to different diameters of work and to level up the shaft. The vibrator spindle passes through a bushing in which it may or may not have lateral play, according to the degree of sensitiveness required by the work. The bushing is surrounded by a rubber cushion which permits of sufficient vibration under ordinary conditions, and at the same time prevents undue motion of the indicator. At the top of the spindle are two pairs of friction wheels upon which rests the part to be tested and trued for balance. The vibrator acts against a lever that imparts its motion to a pointer, which indicates by its vibration the presence of error and by the amount of its vibration the degree of error. The pointer magnifies the error in the ratio of 10 to 1. It is not necessary to measure the vibration, as the purpose is to eliminate it.

In front of each vibrator is a chuck for holding a pencil which has adjustment vertically and hori-

zontally. The driving shaft to which the cylindrical part is belted is driven in either direction from a variable speed motor. A stand is furnished, having a tray for red lead or other substance for covering the cylindrical surfaces to be used in determining the errors of balance, the pencil thus making a mark without scratching the finished work.

After starting up the machine the surfaces are given a coat of red lead with a roller. The brass pencil is then brought forward by a micrometer screw until it is touched by the vibrating shaft. Inasmuch as the contact is made while the work is revolving on its mechanical axis the mark will be on one side only. Theoretically, if the mass were revolving free in the air, one mark would be sufficient to show the light side, but as the friction wheels and vibrator have a certain amount of inertia within themselves they affect the true position of the light side while marking. But revolving in the opposite direction locates the exact point, for a second mark is made on the surface, and the point half way between the two is the exact spot where additional metal should be applied, or opposite which metal should be removed. This operation is performed at each vibrator and continued until all pointers cease to vibrate, which proves that a running balance has been obtained. The reason for the variable speed motor is that the speed varies at which a revolving body best synchronizes with the vibrators upon which it rests, to give the greatest amount of movement to the pointer. With each new part to be tested the operator tries the various speeds, until he discovers that which best tells the error. A piece balanced at one speed is balanced at all speeds.

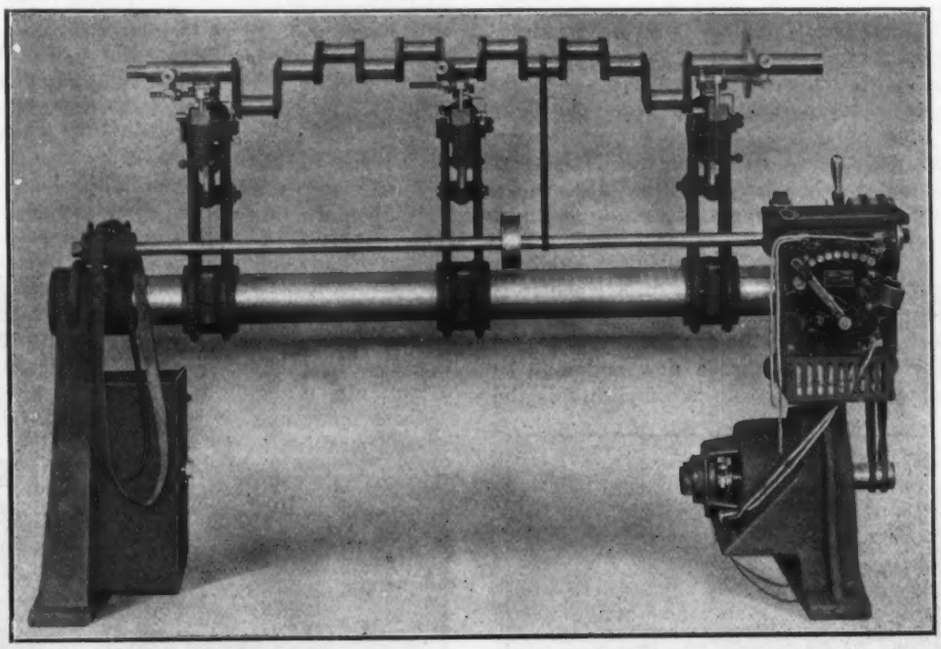


Fig. 3.—The Machine Set Up for Testing a Six-Throw Crankshaft.

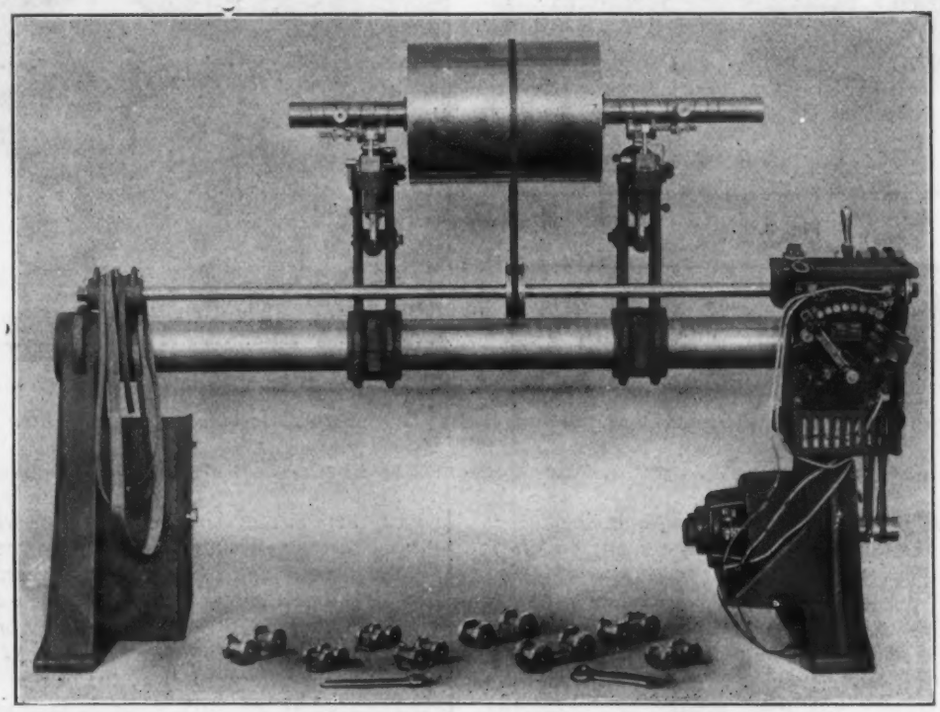
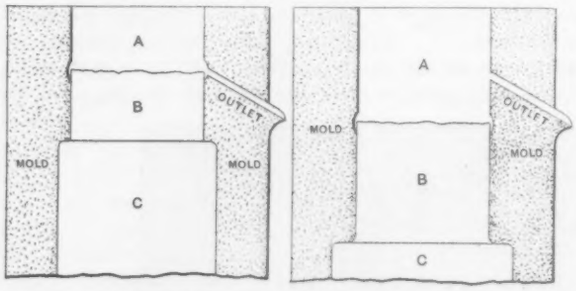


Fig. 4.—A Large Cylinder Ready to Be Corrected for Dynamic Balance.

The method of making the correction differs with various forms of work. In one, as in a pulley, weight is added in the form of putty until the balance is found, when the putty is removed and weighed and its equivalent in lead put in its place, final correction being made after this is done. With automobile crankshafts filing or grinding will work the same results. It is not a difficult matter to determine the method to be employed for any piece of work.

Repairing Steel and Iron Rolls.

Steel works and rolling mill companies have shown an interest in the employment of thermit in repairing steel and chilled rolls, either where there has been a



Figs. 1 and 2.—Method of Preparing the Mold for the Repair of Broken Rolls.

complete break or where only a small piece has been broken out. In cases where a neck or a wobbler is entirely broken off the thermit process is simply used for the purpose of bringing the fractured surface of the roll to fusing heat, so that a new end may be burned on without difficulty. To accomplish this the roll is placed on the ground in a vertical position and a mold constructed of molding sand, thoroughly dried, is placed about the fractured end. This mold is provided with an outlet or skim gate about 8 in. above the fractured surface. Some steel works prefer to place the skim gate on a level with the fractured end, but it is considered better practice to locate it higher up. Figs. 1 and 2 illustrate the method of burning on an end where there has been a square break, the preferred position of the gate being shown in Fig. 2. C is the roll proper, B the neck of the roll and A the end cast on by the use of thermit metal.

A quantity of thermit, figured at the rate of 40 lb. to the square foot of surface to be welded, is then placed in the mold and ignited. The heat of the reaction raises the temperature of the fractured surface to the fusing point and makes it possible to "burn on" a section of metal to replace that broken off. This is accomplished by pouring in hot steel from a ladle as soon as the thermit reaction is completed. In the case of a cast iron roll, molten iron is used instead of steel. The pouring is continued until all trace of thermit steel and slag has been washed from the welding surface, when the outlet is plugged up and the mold filled to the top with metal. The waste used in washing off the surface is caught in a suitable receptacle and used to pour small castings. After the weld has cooled it is annealed by bringing the roll up to a temperature of 1200 degrees F. and holding it there for five or six hours, after which it may be allowed to cool down slowly.

Rolls up to 44 in. in diameter have been successfully repaired in this way, and the process has also been used in welding on sections of steel to the shafts of large pinion gears. It is stated that the cost of any of these operations, including thermit, labor, annealing and machine work, amounts to only a fraction of the cost of a new roll or shaft.

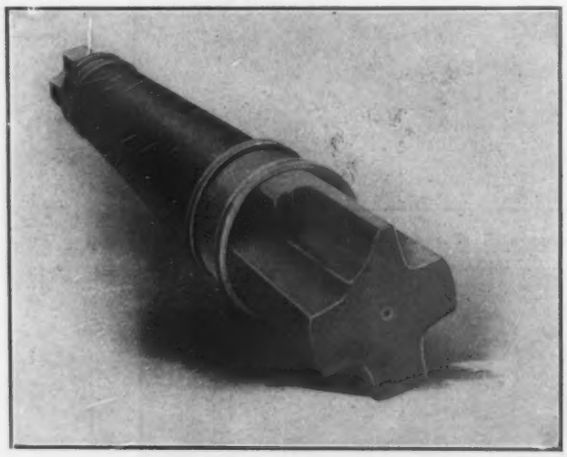


Fig. 3.

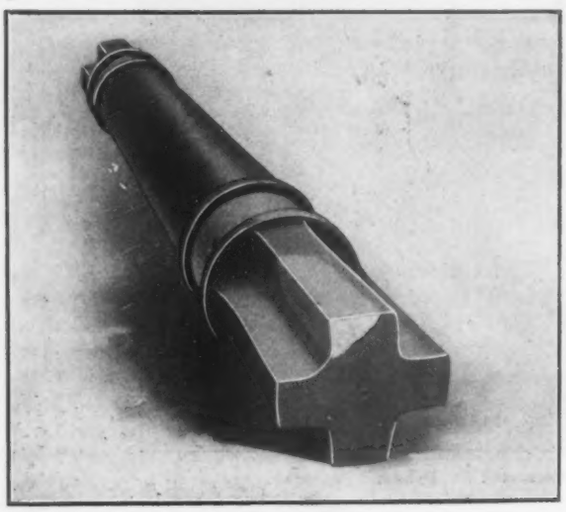


Fig. 4.

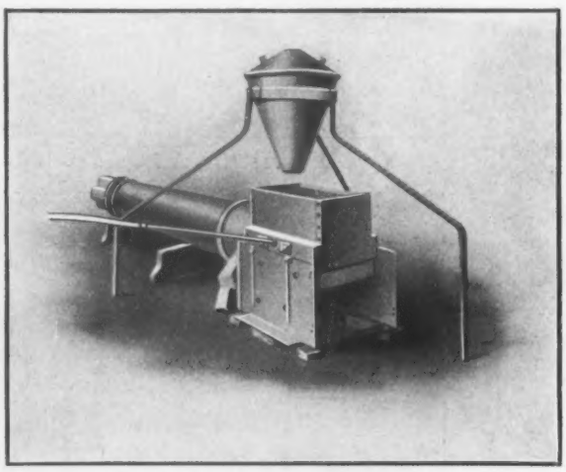


Fig. 5.

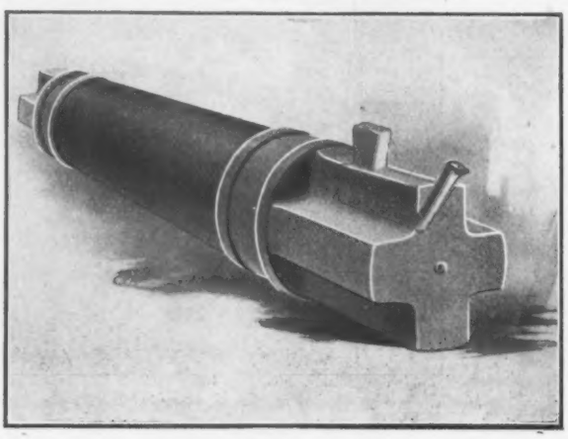


Fig. 6.

The Various Steps in the Repair of a Roll Break by the Use of Thermit.

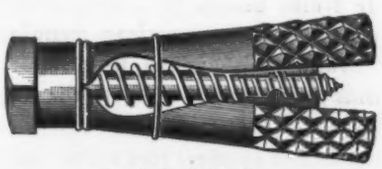
It has been asked why it is not possible to "burn on" a new end without the aid of thermit, by simply washing through a sufficient quantity of steel. The answer is that steel cannot be "burned on" in that way, as it can very seldom be made to stick. The first steel that runs into the mold partly adheres to the fractured end; a little more will stick to this, and so on, eventually the fracture being covered with a coating

of steel which does not amalgamate with it yet prevents the other steel from amalgamating.

It often happens that the entire wobbler or neck is not broken off, in which case the repair is comparatively simple, as a new piece can be welded in of thermit steel. To accomplish this a pattern of yellow wax is molded into place of the exact shape desired in the finished repair, and a mold built around this in the usual manner, provision being made for an opening at the bottom for the purpose of preheating and for a pouring gate and riser. Figs. 3, 4, 5 and 6 show the successive steps in this operation, which are all carried out in accordance with the standard thermit practice of the Goldschmidt Thermit Company, New York. With the mold in place, the wax is melted out by a gasoline torch operated by compressed air and the heating continued until the metal at the fracture has been brought to a bright red heat. The preheating hole is then plugged up with a dry sand core, backed up with a few shovels of molding sand, and the charge of thermit in the crucible is ignited. The thermit steel going into the mold amalgamates with the fractured end of the roll and thus a new piece of steel is welded in to replace that broken out.

The Brohard Lag Screw Expansion Bolt.

A new type of patent lag screw expansion bolt, herewith illustrated, is being placed on the market by the Brohard Company, Philadelphia, Pa. These bolts have what is termed a double expansion, in that both the cases and the nuts expand. The smaller sizes have



Two-Side Bolt, Open.

Three-Side Bolt, Closed.

The Brohard Lag Screw Expansion Bolt, Made by the Brohard Company, Philadelphia, Pa.

a two-side expansion, while the larger ones have a three-side expansion. The cases and the nuts are of malleable iron, the outer surfaces of the cases being roughened, so that a firmer grip may be had on expansion. The nuts are sectional, being either in two or three parts, corrresponding with the expansion of the cases. Each nut section has an interlocking lip to insure its return to a proper position when the expansion is released; a rib in the inner side of the case, fitting into a groove in the back of the nut sections, also holds the nut in proper position in the case at all times. When assembled, the cases are maintained in position by two spring wire clips. The two-side expansion bolts are made in ¼ to ½ in. sizes, while the three-side expansion lag screw bolts are made in sizes ½ in. and upwards. Any standard lag screw bolts fit these cases.

The Boston Steel Fabricators Acquitted of Conspiracy.—The long trial of the Boston steel cases, in which most of the prominent structural steel fabricators of New England figured as defendants, was brought to an end last week by a jury's verdict of acquittal of those whose cases had not already been dismissed by the court for lack of evidence. The indictments were the outcome of investigations made by the Boston Finance Commission, which maintained that steel interests doing business in Boston had conspired to obtain a monopoly of contracts, the means employed being a bureau of information open to all and a so-called agreement, with a result, according to the Government's contention, that illegal profits had been realized and outside concerns driven from the field. Many of the leading lawyers of Boston were engaged in the long trial. The vindication was complete.

The State of Texas to Go Out of the Iron Business.

AUSTIN, Texas, December 11, 1909.—The State of Texas has decided to go out of the iron business.

Several years ago large tracts of iron ore land, situated in the vicinity of Rusk Penitentiary, were purchased and railroad and other transportation facilities were established to bring the ore from the mines to the 100-ton furnace which was erected. A cast iron pipe foundry with a daily capacity of 20 tons was built and everything arranged for carrying on the industry. The Legislature made an appropriation of $150,000 which was used in experimenting as to the possibilities of the industry.

The results were satisfactory for a time, but during the last two years the furnace has been operated at a heavy loss. The last Legislature made another appropriation of $100,000 in aid of the industry. The last of this money has been spent without bringing in any returns to the State. At a meeting of the Board of Penitentiary Commissioners just held it was decided to shut down the furnace and pipe foundry and abandon the industry as soon as the stock now on hand can be cleared up. There are approximately 3000 tons of pig iron on hand, which will run the pipe foundry full capacity for about three months. It is at present running on half time. It is claimed by members of the board that the convicts are worth more to the State from a financial standpoint by being kept within the walls of the prison and idle than to work them in the iron industry.

It is understood that the board contemplates selling the furnace, pipe foundry and ore beds to private interests. The State railroad which ran from the prison at Rusk through the timber land and iron ore field, a distance of 10 miles, was recently extended to Palestine, 30 miles. The particular object in building this road was to give the penitentiary an outlet for its iron products and to cheapen the cost of supplies. The road has been operated at a loss ever since its completion a few months ago, and with the abandonment of the iron industry it will suffer a heavy loss of traffic and become a still greater burden to the State. It has been the plan of the political promoters of the railroad to extend it all the way across the State, but it is considered unlikely, in view of its present unsuccessful operation, that the Legislature will be willing to make any additional appropriation for its extension. H.

The visit of engineering students throughout the Central West has come to be an annual affair at the great works of the Dodge Mfg. Company, Mishawaka, Ind. The journeys begin at the close of the year, usually the latter part of November or early in December, special trains being chartered for the occasion. December 3 the junior and senior engineers of Purdue University, Lafayette, Ind., were taken care of by the company. The party numbered about 180, not including instructors of the university who accompanied the boys. Dodge officers, department heads and Purdue alumni on the Dodge engineering staffs made up a large entertainment committee which had charge of the visitors during the day. The boys were given a dinner by Melville W. Mix, president of the Dodge Company, at the new Mishawaka Hotel, of which he is also the head.

THE IRON AGE

Established in 1855.

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The Place of 1909 in Pig Iron Production.

That the pig iron output of 1909 would approach that of 1907 by less than 1,000,000 tons seemed scarcely probable three months ago. The actual attainment of the high point of 1907 now seems not only possible, but probable. The unknown factors are the production of charcoal iron, for which no statistics have been gathered since the first half of the year, and the ability of the coke and anthracite furnaces to maintain throughout December the rate at which they were operating when they entered the month. Publicity has been given in the past week to predictions that 1909 will stand third in the line of great years, 1907 coming first, with 25,781,361 tons, and 1906 second, with 25,307,191 tons.

To recover in less than two years the ground lost through a panic that as one of its first effects cut the operation of iron and steel works to less than half the average output of 1907 is simply marvelous. To-day the blast furnaces of the country are producing at a rate nearly 20 per cent. beyond that of the great year which ended in disaster. It is now certain that the total pig iron output for the second half of this year will exceed that for the first half by a far greater difference than has ever been known between any two contiguous six months periods in the history of the industry, where output was increasing. On declining production no such spectacular difference has ever been seen as that between the second half of 1907 and the first half of 1908. It is of interest to note what production of coke and anthracite iron in December and of charcoal iron in the second half of 1909 will be necessary to give a production for this year equal to that of 1907. The official figures for seven half-year periods are as follows in gross tons:

	1906.	1907.	1908.	1909.
First half	12,582,250	13,478,044	6,918,004	11,022,346
Second half	12,724,941	12,303,317	9,018,014	*14,759,015
Totals	25,307,191	25,781,361	15,936,018	*25,781,361

* Assumed.

The production of coke and anthracite iron in the five months ending with November, as given in our monthly statistics, is shown below, together with the December production which would result from the maintenance through the month of the same rate at which the furnaces were operating when the month opened:

	Gross tons.
July	2,103,431
August	2,248,930
September	2,385,206
October	2,599,541
November	2,547,508
December, reckoned at the rate of December 1	2,653,662
Required charcoal iron output in second half to equal 1907 total of all pig iron	220,737
Total	14,759,015

A charcoal iron output of 220,737 tons in the second half of the year could be readily reached on the present effective capacity for producing such iron. The production in the first half of this year was 171,389 tons.

From the above figures it is evident that pig iron production in 1909 will come close to that of 1907, and that it is not impossible for 1909 to become a banner year.

An Abuse of American Export Trade.

A man who has spent many years of his life selling American made machinery and supplies in China was asked a few days ago by one of a group of machinery men whether China would be an extensive buyer of more than the simplest machinery within the present generation. He replied that China already has its skilled mechanics in good numbers and within a decade will be an important user of machine tools and similar equipment. He took occasion also to lay a few homely truths before his hearers regarding the mistakes made by many American manufacturers in handling or, rather, mishandling, their export business. His criticisms did not alone apply to the way business is handled in China, but to the export trade generally.

The speaker said in effect that many manufacturers who are especially careful as to the character of their agencies in this country are woefully careless in the matter of their foreign representation, and they do not trouble themselves to ascertain how so-called "manufacturers' agents" represent their lines abroad. Some of these buccaneer export houses do business on the plan of getting a customer once and, in the vernacular, "getting him good" that once. Consequently a manufacturer who sells his product to an exporter of this kind is more than liable to have his goods misrepresented, while the buyer is invariably overcharged. The exporter is willing to make any claims for the product he is selling providing his statements influence an exorbitant price. The manufacturer does not come in direct contact with the customer, but is paid for his goods by the exporter. In remote cases he hears from the outraged customer later on, but he stands little chance in hearing a complaint from Chinese houses. When his goods are mentioned to a Chinese buyer who has once been overcharged for them, the imperturbable native who has been served thus gives the stock answer for such cases, "No can do," and that settles it. No amount of argument can bring out the cause of the grievance, and too often the buyer refuses to consider any goods of American make.

There are plenty of export houses that do a legitimate business, but there are also too many of the other kind. These people are doing incalculable harm to the cause of American manufacturers abroad, and in a country with such vast possibilities as China possesses the work of these export buccaneers is most damaging.

Attempts to Buy Machinery Directly.

Occasionally a buyer of machine tools attempts to place business directly with builders who sell their products through dealers, and demands the dealers' discount. Such cases usually arise from a complete misunderstanding on the part of a customer. He does not realize that the machinery manufacturer in giving to the dealer a discount of 10 or 12 or 15 per cent. is simply charging up in this form the largest factor of selling cost instead of putting on his books the various items of expense attending the maintenance of a selling force of his own. Should he dispense with his dealers the cost would be at least as large, and the general opinion is that it would be greater, such having been the common experience of those who have tried both systems. Therefore the total cost of the product would certainly be as great and the price to the customer would correspond.

The buyer who would go over the head of the dealer should apply the experience of his own concern to that of the machinery manufacturer. The expense of selling goods exclusive of the cost of manufacture is always large. The effort must be to make it as effective as possible in its relations to profits. If it is more profitable to employ established agencies—in other words, the dealers, each preferably with his own exclusive territory—the customer should consider that he may be the gainer rather than the loser by the arrangement. If there is no difference in price of machinery as between the operation of the two systems the result to the buyer may still be advantageous. The dealer in a community is an always available source of information to shop owners. Oftentimes his position as an intermediary between the buyer and the manufacturer results in economy to the former. The dealer's salesmen are always at the call of the people whom they serve. They are experts. Each house has its own line of tools, which its representatives exploit, but the good salesman finds it a wise policy to be unselfish at times and will advise his customer honestly, even though by doing so he may sacrifice a certain amount of business. He stands back of his sales and is on the ground, which is an important factor. He assists in establishing the best practice with his machines. According to the theory of those manufacturers who employ agents, not only is the cost of machinery lower than would be the case if an individual selling force was maintained, but the customer receives a more satisfactory service.

Sometimes a buyer in going directly to the manufacturer has as his motive the expectation of making a friend, who sooner or later will become a customer himself. He may have something of his own to market and may seek to effect a sale by a purchase. Once in a while this method may be successful, but usually the effort results as well where the sale is made through the dealer. Under an exclusive territorial agreement he gets his commissions anyway, for he is entitled to all business within the limits of his geographic field. The customer should remember that when he buys through the dealer he makes two friends instead of one, and it should never be lost sight of that a machinery house can be of very valuable assistance to manufacturers of many lines of product. It is human nature that a machinery merchant, in common with all other business men, will strive most to help those who help him.

The Percentage of Bessemer Lake Ores.

Attention has been directed frequently to the decreasing iron content of Lake Superior ores. Perhaps more emphasis has been put upon this tendency than was called for. It has been a very gradual development, but as with the hue commonly raised over the exhaustion of our iron ore supply, there has been a disposition to put the case sensationally. Little has been said, however, about the change in the percentages of Bessemer and non-Bessemer ores from the Lake Superior ranges in recent years. Naturally the non-Bessemer percentage has been steadily growing, with the enormous development of the open hearth process. But the fact that the Bessemer steel industry rests almost exclusively on the high grade ores of the upper lake districts, while the prominent Eastern and Southern deposits and the numerous scattered mines of local importance contribute to the basic steel output makes a difference in the two movements. That the Bessemer ore shipments from Lake Superior are still more than half the total may be a surprise to those who look at the great preponderance of basic, foundry and forge irons, and who note how marked has been the increase in basic steel production in the districts directly tributary to Lake Superior.

It will be of interest to note in the percentages given below how marked has been the decline in the Bessemer ore proportion, for both the Mesaba and the old ranges, in the shipments of the past nine years. That the Mesaba range has been the mainstay of the Bessemer steel industry is strongly indicated by the figures for the earlier years of the decade:

Percentage of Bessemer Ore Shipments from Lake Superior.

Year.	Old range.	Mesaba.	Total.
1900	65.00	No record.	....
1901	67.50	72.50	70.00
1902	60.50	80.50	71.00
1903	63.00	80.50	73.00
1904	61.00	78.50	71.50
1905	58.50	72.50	67.00
1906	56.00	72.50	67.00
1907	51.50	66.00	61.50
1908	48.00	59.50	56.00

The above percentages represent only the tonnages which are classified as straight Bessemer and non-Bessemer. They do not include what are classed as manganiferous, low grade and silicious ores. Of these last named ores about 65 per cent. of the shipments of recent years have been Bessemer. Adding this Bessemer tonnage to that represented by the Bessemer percentages above, and taking no account of the remaining 35 per cent. of the silicious group, would raise the Bessemer percentage of old ranges about 3 per cent., and of the total about 0.5 to 1 per cent. On the other hand, if all the manganiferous and silicious ores—Bessemer and non-Bessemer—be put in a class by themselves and added to the Bessemer and non-Bessemer ores represented in the above table, the straight Bessemer percentage of the total shipments would be decreased between 8 and 9 per cent. in old range ores, and 4 to 4.5 per cent. in the total.

Some interesting considerations are suggested by the relative decline in the demand for Bessemer ores, particularly as to the higher price per unit such ores have commanded for many years. Their comparative

scarcity promises to maintain this higher unit price. The percentage of silicious ores may not be maintained, however, since with the lowering of the iron content in Mesaba and all other ores there is less necessity of adding silicious grades to supply slag volume in the blast furnace.

Corporations May Again Become Partnerships.

The troubles of corporations have been multiplying at a remarkable rate in the past 10 years. If these difficulties go on increasing at the same rate it is probable that the near future will see the surrender of charters by a large number of the smaller industries which now do business under corporate names. Free corporation laws are a very recent incident of the world's commerce. Half a century ago men who wanted a corporate charter for any enterprise had to apply to their State legislature for a special act creating the artificial person in whose name the business was to be conducted. These requests became so numerous that soon after the civil war the States generally adopted constitutions or amendments under which their legislatures enacted general corporation laws, and corporate charters were granted by some official of the State upon proper application and compliance with general provisions of the law. The free corporation created in this simple, inexpensive manner became such a valuable instrument of commerce that in recent years even the smallest industry is incorporated and a large proportion of the retail stores. For a large industry or commercial house a corporate charter has been deemed a necessity.

In recent years, however, there has been a cumulative growth of restrictive legislation. This first took the form of so-called "foreign" corporation laws, in which one State provided that a corporation holding a charter from another State must obtain a license before being permitted to do business within the State which enacted a law of this character. A New York corporation, for example, cannot do business in Illinois, Kansas or Texas until it has complied with the "foreign" corporation laws of those States, and so throughout the Union. To-day many manufacturing concerns have to comply with such laws in nearly every State.

At first these enactments were very mild in character, and gave the necessary license to a "foreign" corporation upon the payment of a nominal fee, and it was easier to comply with them than to employ counsel to advise whether or not a company should comply. In thousands of cases these fees were paid by manufacturers who are engaged strictly in interstate commerce. A manufacturer or jobber who merely sells goods by mail or through travelers in another State is not doing taxable business within that State, and it is unnecessary to comply with these laws. Such business is strictly interstate commerce, and the States cannot regulate or tax it, but as the cost was small manufacturers generally paid the tax in all the States in which they sold goods, although they were legally bound to pay it only where they maintained a branch house, carried stocks of goods and legally carried on business "within" the State.

In the course of time these laws became more exacting. Instead of paying a tax once for a license that was good for an indefinite time, the "foreign" corporation was required to pay it every year. The most progressive States adopted the plan of graduating the tax according to the amount of capital stock of the corporation. They also required searching annual statements of the entire business of the company showing the annual profits and other important information. Some require each year an affidavit certifying that the corporation has not committed this or that particular sin during the preceding year, and in many other respects these regulations have been carried to an extreme degree. A State cannot impose any of these restrictions upon the living citizen of another State, because the living man is guaranteed by the constitution of the United States the right to live and engage in business anywhere; but a corporation, although it is a "person," is not a "citizen," and when it goes outside of the State which gave it birth must comply with such regulations as the State it enters may see fit to impose.

The most recent improvement in State laws of this character is a provision that once a "foreign" corporation has complied with the law and appointed some State official to act as its legal agent, "such appointment and stipulation shall continue in force irrevocably so long as any liability of such corporation remains outstanding in this State." It has been estimated by legal experts that after a corporation has ceased to do business in a State it could not legally withdraw from the State until 5 to 15 years after it had actually ceased to do business in it. Meantime the annual taxes or other fees must be paid; if not penalties will accumulate for years. Some of the State officials who administer these laws have taken the view that once a corporation has put its paw in the trap it cannot get away without an actual dissolution and surrender of its charter in its home State, but must go on paying whatever taxes may be assessed against it in all the States in which it has made itself subject to these laws. Cases have arisen where the officials now managing a corporation did not know that they were liable under the laws of some distant State, but the records disclosed that some predecessor in the management of the company had complied by filing papers, perhaps years before, and a growth of penalties of several years' standing has accrued. Meantime the company cannot sue for a debt in that State until it has settled these claims for fees or taxes and penalties.

Congress has now dropped its contribution into this muddle of corporation laws by enacting a tax on the profits of corporations which no one seems able to understand. The leading chartered accountants of the country, whose principal business is to audit the affairs of large corporations, insist in their correspondence with the attorney general that it will be physically impossible for the average manufacturing or commercial company to comply with the law. All of which has led the counsel for the Agricultural Implement Manufacturers' Association to suggest the advisability of surrendering corporate charters wherever possible and conducting business in the form of private copartnerships.

The Engine Lathe Standardized.

The builders of engine lathes are to be congratulated that they have reached an understanding as to what constitutes a standard machine. The matter has been under active consideration for some time, and

long deliberations preceded a final settlement of the various questions involved. Now standard dimensions are available. A fixed rule governs the swing, length of head, length of bearings, length of carriage, weight of machine, &c. The manufacturer will not be bound within too narrow limits, but variations from the standard will hereafter figure in the price, which is as it should be, according to the consensus of opinion in the trade.

Machine tool building is a branch of industry where harmony of relations as competitors has been developed in a very important way. Every source of disagreement that can be eliminated is a step toward still more congenial conditions. A potent cause of contention has been the difference in amount of swing in engine lathes of a given rating. One 16-in. machine, so termed, swings 16½ in., another 17 in., and still another well above 18 in.; in other words, within the range of the 18-in. class. The claim has been made that lathes of, say, the 16-in. type have been offered in competition under customers' specifications for 18-in. machines, which was made possible because the smaller size had sufficient swing to bring it within the scope of the work as named. Under the new order of things, which comes with the standardization of the entire line of lathes, competition of this description is provided against. There remain some other features of lathe design to standardize, such as the thread on the spindle nose, and doubtless the time is not far distant when the general characteristics of all American machines will come within well-defined limits. The advantage to the customer of many of such changes is apparent to all.

The American Sheet & Tin Plate Company to Expend $4,500,000 at Gary, Ind.

E. W. Pargny, president of the American Sheet & Tin Plate Company, Frick Building, Pittsburgh, Pa., made the following official announcement on Wednesday, December 15: The American Sheet & Tin Plate Company will start at once at Gary, Ind., on an expenditure of $4,500,000 for the construction of a number of plate, jobbing and sheet mills as part of the comprehensive plan for the construction of this type of mills at this place, together with accessories to finish the various grades of products.

The Largest Individual Steel Plant in Europe.—Otto Renz, of the Duisburger Maschinenbau A. G., of Duisburg, Germany, is now in this country. He is connected with the building of the great new works at Esch, Luxemburg, by the Gelsen-Kirchen Company. There are now at Esch six blast furnaces. To these four are to be added and a steel plant is to be erected with five 24-ton basic Bessemer converters, four heavy blooming mills and a series of finishing mills for billets, rails, shapes and bars. The capacity is to be about 900,000 tons per annum, which will make it the largest individual plant in Europe.

The United States Steel Corporation is to be vigorously fought by organized labor. At Pittsburgh December 14, 45 labor leaders, representing every big union in the country, who had been in conference at the Monongahela House for two days, decided to engage in this work, and the American Federation of Labor is requested to send out appeals for contributions to carry it on.

Canada's Iron and Steel Bounties.

TORONTO, December 11, 1909.—At the annual meeting of the Dominion Grange, which was recently held in this city, a resolution was passed expressing again that body's disapproval of the iron and steel bounties and of the bounty principle. On this point the Grange no doubt truly reflects the opinion of Canadian farmers generally.

The time is at hand when the question of abandoning the bounty arrangement or renewing it must be settled. On the completion of the next calendar year the quinquennial period covered by the iron and steel bounties act will come to an end. With the beginning of that year the bounties will enter upon their lowest plane. Pig iron made wholly from Canadian ore will then draw 90 cents a ton, and that produced from imported ore will draw 40 cents a ton. The rate on puddled bars will be 60 cents a ton and will be the same on steel ingots. Pig iron made by the electric process and steel made the same way remain at $2.10 and $1.65 a ton, respectively, as they are this year, at the beginning of which they came into force. They are to hold until the end of 1912. The bounty on wire rods will be next year, as it has been uniformly since it came into force, $6 a ton. The act creating that particular bounty neither fixes the term throughout which it is to be in effect nor provides for its gradation to lower rates. The bounty on lead is likewise invariable at $15 a ton, and is to continue at that rate until the end of the calendar of 1913.

Notwithstanding that the bounty on pig iron and steel ingots scales down to the final rate and ceases in a little more than a than a twelvemonth, preparations go on for increasing the producing capacity of all the chief iron and steel plants in the country. Projects are on foot for the building of new blast furnaces and new open hearth furnaces. The two new open hearth furnaces upon which construction has already begun for the Dominion Iron & Steel Company will greatly add to the output of that corporation. Similarly, the new blast furnaces to be constructed at Sault Ste. Marie will enable the Algona Steel Company to produce more rails. It is not to be supposed that the companies know the mind of the Government in respect to the future of the counties more than do the general public.

It has been said—officially, if one is not mistaken—that the economies effected in the cost of production at Sydney have more than kept pace with the declension in the bounties. If that is so, the steel companies will not be put off a profit footing by the termination of the bounties.

The excellence of these reports, combined with the stiffening opposition of the farming class and of the country in general, will tend to deter the Government from recommending Parliament to re-enact the bounty law. It therefore seems reasonable to expect and almost safe to predict that the disappearance of the pig iron, puddled bar and steel ingot bounties will be complete and final at the end of 1909. The bounty on steel rods, as has already been mentioned, has no limit placed on its duration. It will doubtless be continued until the pressure of public opinion bears with such force and directness upon it as to compel the repeal of the law.

It is worth noting in this connection that among the new works to be added to the Dominion Iron & Steel Company's plant is another rod mill. The decision to erect and install this new mill was, it appears, reached less than three weeks ago. The company's rod bounties alone should aggregate a large sum annually, for the demand for wire in this country now dwarfs the demand that was to be supplied when the company's first rod mill was built. The Western country is becoming settled at a rapid rate and is growing in wealth in still greater ratio. The wire market on fence account in that part of the country is of constantly enlarging capacity. In fact, it is the reasonable assurance of a demand capable of absorbing all their output at profitable prices that warrants the companies in preparing for production on a larger scale, notwithstanding the loss of bounties. Besides, there will still remain high protective duties on such finished products as steel rails. C. A. C. J.

The American Institute of Chemical Engineers.

Second Annual Convention.

The second annual convention of the American Institute of Chemical Engineers was held at the Hotel Walton, Philadelphia, December 8 to 10, inclusive. The institute thus returned for its convention to the city of its birth, having been organized June 22, 1908, at a meeting held at the Engineers' Club in Philadelphia.

Quite a representative attendance marked the opening session on Wednesday morning. After the president, Dr. Samuel P. Sadtler, called the meeting to order, an address of welcome was made by William Gleason, secretary to Mayor John E. Reyburn.

Reports of Committees and Officers.

The Membership Committee reported that the institute's membership now totaled 105. It also proposed for discussion an amendment establishing a junior grade of membership, believing that the association of younger men with those of longer professional experience would have a stimulating effect on the junior members, and aid materially in raising the professional standing of chemical engineers. Such junior members would become eligible for membership at the age of 23; should be graduates of an approved university or technical institute, and be engaged in some branch of applied chemistry at the time of application for junior membership. They would have no vote, nor be eligible to office, but could become active members on reaching a certain age limit. Action on the proposed amendment was deferred under the by-laws until the next meeting of the association.

The Committee on Chemical Engineering Education, Dr. C. F. McKenna, chairman, made a progress report, stating that the plans followed by the various institutions showed great improvement in this direction during the past few years. Continued investigation is being made by the committee covering the necessary essentials for such education. Dr. Olsen stated that the committee should hasten its work, as a number of institutions are anxious to rearrange their engineering courses to better fit graduates for professional work and will greatly appreciate suggestions coming from the institute.

The annual report of the treasurer, Wm. M. Booth, showed that the society is in a satisfactory financial condition.

Dr. Edward R. Taylor, Pen Yan, N. Y., read an interesting paper on "A Method for Smelting Iron Ore in the Electric Furnace," following which he spoke on "Waterways and Water Power," saying, in part, that waterways must be treated on broad lines and coordinated with other interests. What a person or corporation or a State may do with a given stream might block a more comprehensive or natural development. Considerable attention was given by the speaker to canal and waterway propositions of a national character.

The institute passed a resolution calling on the National Rivers and Harbors Congress in session at Washington, urging upon it the realization of the importance of forestry and water storage, and further urging that hydraulic, chemical and electrical engineers should be associated with other engineers, so that coordination of every interest could be obtained for the good of the people and the highest development of every interest. This resolution the secretary was instructed to transmit to the Rivers and Harbors Congress.

During the afternoon the members visited in sections the chemical, engineering and physical laboratories of the University of Pennsylvania, the Commercial Museum of Philadelphia and the chemical works of Harrison Brothers & Co., luncheon being served by the latter firm to the Section visiting its plant.

Officers Elected.

At the evening session the following announcement of the letter ballot for officers for the ensuing year was made:

President, Charles F. McKenna, New York; first vice-president, F. W. Frerichs, St. Louis, Mo.; second vice-president, Edward G. Acheson, Niagara Falls, N. Y.; third vice-president, Dr. Eugene Haanel, Ottawa, Canada; secretary, John C. Olsen, Brooklyn, N. Y.; treasurer, Wm. M. Booth, Syracuse, N. Y.; auditor, H. S. Renaud, New York. Directors to serve for three years, Dr. Samuel P. Sadtler, Philadelphia; Wm. M. Grosvenor, New York, and R. K. Meade, Easton, Pa.

The retiring president, Dr. Samuel P. Sadtler, made an address, his subject being "Conservation and the Chemical Engineer," in which he showed comprehensively the important part already taken by the chemical engineer in the utilization of waste products.

An address by Professor Charles E. Monroe, Washington, D. C., followed, his subject being "The Chemical Industries of America," in connection with which maps, tabulated charts and interesting statistics were given, particularly relating to the manufacture of explosives, chemicals and wood distillates.

Excursions and Banquet.

Thursday morning and afternoon were given entirely to excursions, visiting various plants located on the Delaware River. The members were conveyed on the municipal fireboat Samuel H. Ashbridge to the Torresdale filtration plant of the city, and the wool degreasing plant of Erben Harding & Co., at Tacony. Luncheon was served at the plant of the Welsbach Light Company, at Gloucester, N. J., and the day's trip concluded by a visit to the by-product coke oven plant of the Camden Coke Company, Camden, N. J.

In the evening the annual banquet of the association was held at the Hotel Walton. Dr. Charles F. McKenna acted as toastmaster and addresses were made by various members, as follows: "The Chemical Engineer in the Development of American Industries," by M. C. Wittaker, Gloucester, N. J.; "The Civil Engineer and the Chemical Engineer," by Professor William P. Mason, Troy, N. Y.; "The Chemical Engineer and the Manufacturer," by Robert S. Perry, Philadelphia; "The Institute in the West," by Dr. F. W. Frerichs, St. Louis, Mo.; "What We Have Accomplished," by Dr. S. P. Sadtler, Philadelphia; "The Chemical Industry in Japan," by Jokichi Takamine, New York, and "The Commercial Museum and the Industries," by Dr. W. P. Wilson, Philadelphia.

An Annual Medal Proposed.

Friday morning's business session was called to order by President-elect Charles F. McKenna, the formal installation of officers being dispensed with owing to the lack of time and the number of papers still to be read. Dr. Samuel P. Sadtler presented for discussion a proposed amendment that the institute award yearly a medal, to be known as the American Institute of Chemical Engineers' Medal, for meritorious work in chemical industry or the arts, or the best paper presented at the annual meetings, which was referred to a committee to draft in proper shape for presentation at the next meeting of the institute. Further discussion on the proposed amendment admitting junior members followed.

The question of the next place of meeting for the institute was left to the Committee on Meetings, although a motion prevailed that hereafter the committee present a report on this matter at the meetings, so that the association could act on it while in session. Toronto, Canada, or some other lake point, will, it is believed, be the next meeting place of the institute. Following the business session the following papers were read: "Multiple Effect Distillation," by F. J.

Wood; "The Advantages of the Multiple Effect Distillation of Glycerine and Other Products," by A. C. Langmeuir, and "Reclaiming Waste India Rubber," by S. P. Sharpless.

Early in the afternoon a trip to Trenton, N. J., was made, the plant of the Hamilton Rubber Company and several potteries being inspected.

At the evening meeting, which was the closing session, the following papers were read in part by the secretary, owing to the absence of the several writers: "The Permanence and Acidity of Hydrogen Peroxide Solutions," by Launcelot W. Andrews; "Chemical Composition of Illinois Coal," by A. Bement, and "Heat Efficiency of Smokeless Combustion and Heat Absorbing Capacity of Boilers," by A. Bement.

After transacting further routine business, extending a vote of thanks to the proprietors and officials of the various establishments visited, and to the local Entertainment Committee for its excellent arrangements, the meeting adjourned. A further excursion was announced by the secretary for Saturday morning, when those who desired would be extended the courtesies of a visit of inspection to the plant of the Coplay Cement Company, Coplay, Pa.

PERSONAL.

C. H. Macmillan has been appointed superintendent of open hearth department No. 2 of the Bethlehem Steel Company, South Bethlehem, Pa., succeeding R. T. Harris, who resigned December 1. Mr. Macmillan was formerly in the employ of the Dominion Iron & Steel Company, Sydney, Nova Scotia.

William H. Baldridge, vice-president, representing the Phillips Sheet & Tin Plate Company in the East, has removed from 17 Battery place to 722-724 Hudson Terminal Building, 30 Church street, New York.

Judge George W. Woodruff of the United States Court at Honolulu, Hawaii, has resigned to accept the secretaryship, in connection with duties of a legal advisory character, of the Pocahontas Fuel Company and the Pocahontas Consolidated Collieries Company, 30 Pine street, New York. He will take up his new duties in January.

J. K. Dimmick & Co., Land Title Building, Philadelphia, have engaged the services of Wylie L. Byers, who for several years has been associated in the coke business in the Connellsville region and who will from this time be the Uniontown manager of the firm's office at Uniontown, Pa.

Wilhelm Clemens, Jr., of the machinery firm of Schmidt & Clemens of Frankfort-on-Main, Germany, sailed for Europe December 11, after several weeks' visit among American manufacturers.

V. L. Wills is in charge of the operations at Chester, Pa., of the Delaware River Steel Company, which recently took over the Tidewater blast furnace. Charles Hart, the company's general manager, who is now engaged in the construction of two blast furnaces for Worth Brothers at Coatesville, Pa., will go to Chester later.

S. K. Thompson, formerly mechanical engineer with Stanley G. Flagg & Co., Philadelphia, Pa., has established an office at 703 Real Estate Trust Building, in that city, as a consulting mechanical engineer.

Alex. McInnes, 406 Apollo Building, Pittsburgh, has recently been appointed sales representative for the Pittsburgh District, to handle high quality tool steels and hammered forgings of the McInnes Steel Company, Ltd., Corry, Pa.

Chas. A. Stillman, resident manager of Rogers, Brown & Co., Birmingham, Ala., has been placed in temporary charge of the Chicago office of the firm on account of the illness of E. L. Billingslea. Mr. Stillman will continue to keep in close touch with the Birmingham office and conditions in the district.

The appointment of John Fritz as representative of the United States, to be honorary vice-president of the Iron and Steel Institute, has already been noted. For other countries the appointments are as follows: William Kestranek, Austria; Baron Fernand d'Huart, France; F. W. Lürmann, Germany, and E. J. Ljungberg, Sweden.

Frederick W. Coxe, Philadelphia sales agent of the Cambria Steel Company, has resigned.

Emil Swensson, engineer, Pittsburgh, has been selected by the State Railroad Commission as its representative to see that the Pittsburgh Railways Company carries out the recommendations recently made by the commission for better service.

Machinery Resale Prices.

The Wilmarth & Morman Company, Grand Rapids, Mich., is taking a determined stand on the question of dealers' resale prices. In a recent circular to the trade the company says:

We have endeavored to make plain to all dealers carrying our quotations on New Yankee drill grinders, surface grinders and our other tools that our net f.o.b. Grand Rapids re-sale price, as established by us, must be maintained. Occasionally dealers have cut the price and plead ignorance of our policy in the matter. That there can be no just cause for this in the future, a similar letter to this is being sent to all offices who hold our live quotations.

We reserve, and shall enforce, the right to cancel quotations and refuse to fill orders upon receipt of what appears to us satisfactory evidence that our prices have been violated. Here is a sample of our policy's workings. Within the month a large firm with several branches has been cut off and an order for thirteen machines handed back to them which we refused to fill because it was taken at a cut price; also, a leading Eastern firm with one or two branch offices recently suffered the same fate because of freight allowance.

We ask your co-operation in eliminating price cutters. Advise us of even suspicious cases, and we will, using your information confidentially, endeavor to ferret out the truth or error of your suspicions. This we can usually do. We shall not only cut out price cutters when we happen to find them but shall seek to find any there may be.

Freight allowance or cash discount in excess of 2 per cent. for cash in 10 days is considered a violation of the price.

See that every salesman in your office or on the road and those added in the future are fully posted in regard to this matter. Also we trust for an acknowledgment of this letter by responsible party. Consideration on your part will doubtless show you that our position as clearly stated above, is for your best interest even more than ours. It will, however, work to our mutual advantage.

Lukens Iron & Steel Company Improvements.—Several improvements and additions are being made at the plate mills of the Lukens Iron & Steel Company, Coatesville, Pa. In the universal mill, which is now equipped with horizontal heating furnaces, a four-hole soaking pit furnace is to be built and a 10-ton electric crane will be installed by the Morgan Engineering Company. The electric power plant is being increased by the installation of a Rateau-Smoot 750-kw. turbo-generator set. As an addition to the facilities for handling material in the yard a 10-ton gantry crane of 65 ft. span and 120 ft. over all is being provided. It will be furnished by the Alliance Machine Company, Alliance, Ohio.

The J. G. Brill Company, Philadelphia, Pa., is furnishing to the Pittsburgh Railways Company a large number of steel cars, each 46 ft. 8 in. long, weighing about 44,000 lb., and equipped with steel wheels, Brill brakes and Westinghouse motors. Two motors of 100 hp. are on each car and the air brakes are of the most modern design. These cars are of the "pay at the entrance" type.

OBITUARY.

MORRIS BACHMAN.

Morris Bachman, president of the Sharon Steel Hoop Company, died at Sharon, Pa., December 11, after an extended illness of typhoid fever and blood poisoning. He was born in Strasburg, Lancaster County, Pa., April 12, 1866. He was graduated from the high school and after took a special course at the State Normal School in Millersville. He entered the office of J. W. Hoffman & Co. of Philadelphia, pig iron brokers, thence went to Pittsburgh, where he became associated with the Carnegie Steel Company, William Clark & Sons and J. Painter & Sons.

When the American Steel Hoop Company was formed, which absorbed the leading hoop and cotton tie mills, Mr. Bachman was made general sales agent. After filling that office for several years he organized the Sharon Steel Hoop Company and since then had lived in Sharon. Mr. Bachman was also president of the Sharon Country Club, president of the Buhl Club, director in the Merchants and Manufacturers' National

MORRIS BACHMAN.

Bank, director in the American Steel Foundries and vice-president of the Griffin Mfg. Company of Erie, Pa. He leaves a widow and four children. He did much charity work among the poor of Sharon.

WATKIN Y. WILLIAMS died at Lorain, Ohio, November 30, aged 66 years. He was connected with the Cambria Iron Company mills at Johnstown in his earlier active years and later was superintendent of the Bessemer department at the Edgar Thomson Works of the Carnegie Steel Company. He went to Lorain, Ohio, on the completion of the Johnson Company's steel plant in 1895, being in charge of the Bessemer department. He retired three years ago on account of ill health. His son, I. R. Williams, is superintendent of the Bessemer and open hearth departments of the National Tube Company at Lorain, and another son, Windsor Williams, is superintendent of the Lake Erie Iron Company's rolling mill at Cleveland.

WILLIAM N. MCGUGIN, president of the McGugin Iron & Coal Company, died at Olive Furnace, Lawrence County, Ohio, December 7, aged 92 years. He had been engaged in iron manufacture more than 60 years. From 1846 to 1851 he operated a foundry at Marble Furnace, Adams County, Ohio. He removed to Gallia Furnace, and later became connected with the operation of Olive and Buckhorn furnaces, two well-known charcoal stacks in the Hanging Rock District. The McGugin Iron & Coal Company was organized in 1883 and Mr. McGugin was active in the management of the business almost up to his death.

CHARLES PETERS, general manager of the Union furnace of Rogers, Brown & Co., at Ironton, Ohio, died of heart disease in that city December 7, while in the performance of his duties at the furnace. He had been receiver of the property following its operation by the Union Iron & Steel Company for several years previous to 1907.

G. C. CUNNINGHAM, purchasing agent for the Southern Iron & Steel Company, died at Gadsden, Ala., December 4, aged 35 years. He leaves a widow and two children.

CHARLES S. RANKIN, formerly well known in the architectural iron trade of Cincinnati and vicinity, died December 10 at College Hill, Ohio, aged 78 years. His first business connection was with Macy, Rankin & Co., and after the war he continued in the business under the firm name of C. S. Rankin & Co. He retired about 25 years ago.

The Metal Bed and Bed Spring Manufacturers' Association.—The annual meeting of this organization was held at the Hotel Schenley, Pittsburgh, November 29 and 30. Monday morning was given over to business and in the afternoon a trip of inspection was made to the plants of the American Steel & Wire Company at Rankin, Pa., and the National Tube Company at McKeesport, Pa. On Monday evening the convention was addressed by H. P. Bope, vice-president of the Carnegie Steel Company, Pittsburgh. The following concerns were represented in person at the meeting: Smith Davis Mfg. Company, St. Louis; American Bed Company, St. Louis; Mellon & Strong Company, St. Louis; Evansville Metal Bed Company, Evansville, Ind.; Milwaukee Bed Company, Milwaukee, Wis.; Minneapolis Bed Company, Minneapolis, Minn.; Salsbury & Satterly Company, Minneapolis, Minn.; Royal Metal Company, Brooklyn, N. Y.; Haggart & Marcussen Company, Chicago; Union Wire & Mattress Company, Chicago; Miller Hall Sons' Bed Mfg. Company, Chicago; Art Bedstead Company, Chicago; Simmons Mfg. Company, Kenosha, Wis.; Enterprise Bed Company, Hammond, Ind.; Barcela Mfg. Company, Buffalo, N. Y.; Howard Mfg. Company, Buffalo, N. Y., and about 30 bed spring companies from all over the United States. M. Bardola is president and M. Wulpi secretary of the association.

The Franklin Portable Crane & Hoist Company, Franklin, Pa., builder of the "one man hoist," reports orders coming from locomotive and automobile building, garages, machine shops, electric companies, &c., new uses being found for its cranes continually. The company claims that the Franklin crane and hoist was not originally built with the idea that it would displace the other types of job or traveling crane, but that results showed that in certain manufacturing plants the Franklin machine, when used with either of the other type, proved a profitable investment. An illustrated booklet has been prepared setting forth the range of sizes, capacities and showing actual conditions under which its product is being operated daily.

The Prime Steel Company, Milwaukee, Wis., has purchased the Dutcher Steel Casting Company and increased its capital stock from $50,000 to $350,000. It is the intention of the buyer to operate both plants, one of which will be known as the Prime Works and the other the Dutcher Works of the Prime Steel Company.

NEWS OF THE WORKS.

Iron and Steel.

The Buffalo Union Furnace Company, Buffalo, N. Y., is building an extension to its engine house for the installation of a low pressure blowing engine to use the exhaust steam from the high pressure engines the company now has at the C furnace.

Fannie Furnace of the United Iron & Steel Company, West Middlesex, Pa., will go out of blast next week for relining. It is the intention to blow it in again about 30 days later.

Geo. J. Hogan, furnace engineer and contractor, 401 People's Bank Building, Pittsburgh, has received a contract for a gas producer from the Massillon Rolling Mill Company, Massillon, Ohio, making the third order and three producers in all, and also an order for two Bailey patent sheet and pair furnaces, the second order for installation in the new addition of the National Rolling Mill Company, Mansfield, Ohio.

Heyl & Patterson, Inc., Pittsburgh, contracting engineers and builders of conveying appliances, have received a contract from the Hamilton Iron & Steel Company, Hamilton, Ohio, for a double-strand Uehling pig casting machine of 600 tons daily capacity, also ladle tilt and cast house.

Hall Furnace of the Republic Iron & Steel Company, at Sharon, Pa., will probably be blown out at an early date for relining and other repairs. The company has blown out its No. 1 furnace, at Haselton, Ohio, for relining.

The William B. Pollock Company, Youngstown, Ohio, has received the contract for all the steel work for the new blast furnace to be built by the Republic Iron & Steel Company at Haselton, Ohio.

It is stated that the plant of the Shenango Iron & Steel Company at Wheatland, Pa., which has been in receivers' hands for about a year, will resume operations in part about January 1. The output of the plant is muck bar, iron bars and sheared iron skelp.

General Machinery.

The Joliet Concrete Machinery Company, Joliet, Ill., has been incorporated with capital stock of $25,000 to manufacture and deal in concrete machinery, the incorporators being James Straka, Eneshira Meers and Maurice F. Lemon.

The Geiser Mfg. Company, Waynesboro, Pa., has enlarged its Greencastle factory for the purpose of manufacturing a gasoline traction engine. Its main factory at Waynesboro will also probably be enlarged to turn out a recently designed steam road roller. No purchase of shop machinery is contemplated at the present time.

The Gould Balance Valve Company, Kellogg, Iowa, has closed options on a site at Des Moines, where it will erect a factory and remove its plant if necessary concessions are granted by the city of Des Moines.

The Oswold Motor Company, Goshen, Ind., has leased ground adjoining its plant. The tract is 55 x 330 ft. A two-story brick structure will be erected on part of it. The plant is running night and day.

The Drew Elevated Carrier Company, Waterloo, Wis., whose factory was recently destroyed by fire, is now located in temporary quarters and has a full force of men at work. The company advises that a large portion of its manufactured stock was saved, and orders are given prompt attention. A modern fireproof building will be constructed by the company in the near future.

The Fletcher Enamel Company, Anderson, Ind., will increase its capacity by the addition of two more furnaces and the erection of a large addition to its plant early in the spring.

The Jacobson Machine Mfg. Company, Inc., Warren, Pa., builder of commercial and automatic types of gas engines, has under construction an addition to its machine shop, 65 x 165 ft., of steel and brick, in which a full line of motor driven machine tools will be installed. The company recently decided to go into the manufacture of automobile engines and parts, considerable business of this class being booked during the last few months, and it was for the purpose of increasing its capacity that these improvements are being rushed. Some vacant buildings now on its property are to be utilized in the manufacture of a new type motor for use in street railroad service. A machine now being built for the Warren County Traction Company has a capacity of 225 hp., is equipped with air starter and reversible gear, and will shortly be put on test. In the spring of next year the Jacobson Company expects to build other additions. It is at present rushed with work and on February 1 will commence to operate its various departments 22 hours each day, to continue during the balance of 1910, and is now giving employment to the greatest number of men in its history.

The Titusville Forge Company, Titusville, Pa., manufacturer of hammered forgings, announces that its new improvements are practically completed. These include an 85 x 90 ft. building, containing machinery for making automobile crank shafts, &c.; a 165-ft. crane runway extension from the forge shop over the Lake Shore Railroad, which, with Pennsylvania connections, permits good shipping facilities, and the installation of two new Electric Controller & Supply Company magnets for handling blooms and scrap iron in the yards. A new oil annealing furnace makes it possible for the company to handle material up to 54 in. in diameter and 35 ft. long. Even with its increased production thus provided, and although operating two shifts, the company still has considerable unfilled business booked.

The Cleveland Crane & Engineering Company, Wickliffe, Ohio, has received the order for the entire crane equipment for the American Bridge Company's proposed plant at Gary, Ind., which consists of the following: Four 40-ton 4-M cranes; eight 10-ton 3-M cranes; six 10-ton 2-trolley 90-ft. span cranes; five 30-ton 4-M 80-ft. span cranes; one 25-ton 4-M 60-ft. span crane; one 5-ton 3-M 60-ft. span crane.

Contracts for 13 cranes of different capacities have recently been placed by the Jones & Laughlin Steel Compaany to be installed in its new open hearth steel plant now building at Aliquippa, Pa. Of these eight will be furnished by the Cleveland Crane & Engineering Company, three by the Niles-Bement-Pond Company, and two by the Whiting Foundry & Equipment Company. In capacities the machines range from 25 tons down.

The Union Trust Company, Pittsburgh, trustee in bankruptcy for the Fischer Foundry & Machine Company, sold the plant located at Ford City, Pa., December 13. The plant was sold to an attorney, who declined to state the parties he represented.

Power Plant Equipment.

The E. Keeler Company, Williamsport, Pa., has received a number of orders lately for its water tube boilers, notably among which are the following: Three 408-hp., Pennsylvania Railroad, which boilers are to be equipped with Green chain grate stokers; three 150-hp. boilers for the United States Government, to be installed in the fortifications at Manila, P. I., and also one 500-hp. boiler for the water department at Fort Worth, Texas.

Fires.

Fire in the A. B. Norton Company's structural iron plant at Boonton, N. J., is reported to have done $20,000 damage.

The plant of the A. T. Detlaff, Detroit, Mich., was almost totally destroyed by fire. The damage approximately was $20,000.

Fire in the American Malleable Company's plant at Lancaster, N. Y., caused a damage of about $50,000, destroying the rear of the foundry section.

The Seneca Chain Company's plant, Kent, Ohio, was burned December 10; loss $150,000.

On December 9 a $25,000 fire occurred in the car repair shops of the Southern Railroad at Columbia, S. C.

The plant of the Preston Brick Company, Rochester, N. Y., a three-story building filled with machinery, was destroyed by fire December 8; loss about $35,000.

The Brookville Roller Company's plant at Trenton, N. J., was recently destroyed by fire; the loss reported $15,000.

The briquette factory of the Lehigh Navigation Company, Coaldale, Pa., was recently burned; estimated loss $70,000.

The plant of the Racine Mfg. Company, Racine, Wis., was totally destroyed by fire December 12. The reported loss is $600,000.

The Wonham & Magor Car & Mfg. Company's plant at Athenia, N. J., was destroyed by fire December 12, the loss being about $70,000.

The Pulaski Foundry & Machine Works, Pulaski, Va., was recently destroyed by fire; approximate loss $5000.

Foundries.

The West Steel Casting Company, Cleveland, Ohio, which for the past three years has built up a trade in medium and small steel castings made by the converter process, has lately enlarged its plant and is now installing crucible furnaces which will supply special small castings demanded by the automobile and general trade. The converter will be utilized as heretofore for manufacturing West's electrical steel, which is used for dynamo frames and other electrical work. This metal, on account of its strength and ductility, is also used for gear blanks and general steel castings. The company's officers are Ralph H. West (son of Thos. D. West), president; Everett W. Pike, vice-president, and David P. Lansdowne, secretary.

The construction work of the new buildings being erected by the U. S. Brake Shoe Company, Corry, Pa., is steadily progressing and will soon be ready for the installation of machinery. The Ajax Iron Works, Corry, Pa., is furnishing a 75-hp. tandem gas engine. C. R. Rogers & Co., local contractors, having the entire contract in hand, will furnish a three-phase 220-volt Western Electric generator for direct connection to the engine.

The Western Steel Car & Foundry Company, Anniston, Ala., which has been idle for some time, resumes operations this week. This company has just booked an order for 3000 car axles from the Kilby Locomotive & Machine Works.

Miscellaneous.

The Detroit Bridge & Steel Works, recently incorporated at Detroit, Mich., with a capital of $2,000,000, has purchased 8 acres of land at the Michigan Central Railroad and Dearborn road, upon which two factory buildings, each 150 x 400 ft., will be erected and equipped.

The Eagle Iron Company's furnace at Attalla, Ala., has been leased by a company composed of W. G. Shelow, F. R. Rhodes,

Charles A. Lyerly and W. G. Eaton, and is now being repaired and will be put in blast soon. The only new equipment needed is a water tank.

The Webb-Jay Motor Company has been incorporated at Dunkirk, N. Y., with a capital of $500,000, to engage in the manufacture of automobiles, cars, motors, &c. The incorporators are B. J. Grass, W. C. Marsh and O. F. Hakes, Dunkirk; W. C. Brown, New York City, and E. T. Glennon, Chicago.

The entire plant of the Westinghouse Air Brake Company, Wilmerding, Pa., is now in full operation for the first time in about two years, and is working overtime in nearly all departments.

The Hardware Trade.

Relative to the condition of the hardware trade, *Iron Age-Hardware* of December 11 says:

The year is drawing to its close with a general recognition that its record is going to be, on the whole, eminently satisfactory, and with confident anticipations in regard to 1910. The distributors as well as the makers of hardware are in general enjoying a good business, and conditions in almost all parts of the country are regarded as very favorable for a continuance of a wholesome demand well into the future. Labor quite generally is employed. Nearly all factories are well occupied with orders. Capital is regaining courage and many enterprises, large and small, are under way or projected. There is much activity in building. Railroads are finding their capacity tested by the pressure of freight. They are feeling justified again in spending money. Many lines of goods are advancing in sympathy with the high prices for material, not a few manufacturers experiencing difficulty in making prompt shipments, and some of them are getting considerably behind in their deliveries. Many of them are troubled a good deal by difficulty in getting raw material. In the matter of wages there is not as yet much change, but in some cases increased demands are being made by skilled labor especially. The extent to which prices have been advanced within the past few months is giving the manufacturers some annoyance, as the jobbers are in a position to undersell them if they are so minded, and in some classes of goods they are using their liberty in this regard. The strength of the market is, of course, its dominant feature, and jobbers and retailers alike are buying more freely and with greater confidence that their purchases are secure from the danger of decline than at any time within the past two years.

November Copper Statistics.

The statement issued by the Copper Producers' Association shows that in November, a 30-day month, the production of marketable copper in the United States, from all domestic and foreign sources, was 3,039,340 lb. less than in October, a 31-day month. Stocks on hand at all points in the United States declined 506,099 lb. from November 1 to December 1. The heavy sales made in November are not reflected in these statistics. Following are the November figures, compared with October:

	November. Pounds.	October. Pounds.
Stock of marketable copper of all kinds at all points in the United States at beginning of month	153,509,626	151,472,772
Total production	121,618,369	124,657,709
Deliveries for consumption and export	122,124,468	122,620,855
Stock on hand at close of month	153,003,527	153,509,626

The November deliveries for domestic consumption were 66,857,873 lb. and for export were 55,266,595 lb.

The Toledo-Massillon Bridge Company, Toledo, Ohio, has recently added a new department to its business and has gone extensively into the manufacture of cranes, hoists and coal and ore handling machinery. C. H. Tucker, recently of the Case Crane Company, will have charge of this department.

The Newark Municipal Employment Bureau.

The city of Newark, N. J., is operating an employment bureau along novel lines which promises to be of great help to both unemployed citizens and employers generally. The city has opened in the office of the Bureau of Statistical Information a department where applications from unemployed residents of the city are filed. Through the local Board of Trade and other manufacturers' organizations the bureau is receiving excellent support, and although it has been in operation only a few weeks it is declared to be highly successful. The bureau is carried on under the direction of the city clerk, and at present its efforts are being confined to the registration of unemployed male inhabitants of the city and requisitions are filed from employers.

No charges are made for the services of the department, but it is expressly stipulated that applicants for employment must register by letter. They are asked to state plainly their name and place of residence and whether married or single. Upon receipt of this information by the department the writer is furnished by mail with a card to be filled out and returned to the bureau. This card asks questions as to the age and previous occupation of the applicant, his trade, &c. A number of investigators are attached to the department who investigate the references given by applicants and make a report as to their character and reputed ability to do the work they are applying for. On this point those in charge of the department, in an announcement of the organization of the bureau, state: "The bureau proposes, through its agents, to investigate with delicacy and secrecy the statements of the registrants seeking employment, that it may relieve prospective employers of the work incident to reference, where it is required, and through such preliminary verification to prevent fraud and be prepared to fill requisitions for labor without unnecessary delay."

The department not only investigates the character of the applicants for positions, but it also obtains assurance that manufacturers who file requests for labor are in a position to fulfill whatever promises they make. The department is decidedly neutral as to the question of unionism and it has received the indorsement of the Essex Trade Council, which is a federation of the labor organizations of the county and the Newark Board of Trade. So far it has been the policy of the bureau to leave the question of open or closed shops between the applicant and the manufacturer. In other words, that subject has not been touched. As Newark is essentially a manufacturing city the majority of applications for positions filed with the department thus far have been made by mechanics and laborers, although the applications vary from requests for jobs by truck drivers and applications from office men who have earned as high as $3000 a year. Machinists, toolmakers and other skilled mechanics have made applications to the bureau and employers of that class of labor have given it their hearty support. In fact, the responses from manufacturers of all classes of labor have been decidedly encouraging and the bureau is now carrying on a campaign calculated to bring the department to the attention of every employer of male labor in the city. It is intended later on to have registration cards for those asking employment at stations in various sections of the city.

Reports that the Ohio Iron & Steel Company, operating Mary Furnace at Lowellville, Ohio, will build an open hearth steel plant are premature. The company has had such a project under consideration for some time, but nothing definite has yet been done. A meeting of the Board of Directors has been called, to be held in Youngstown December 15, at which the matter will be taken up.

The Iron and Metal Trades

An Advance in Wire Products.

Pacific Coast Fabricators Buy Foreign Steel.

The expected advance of $1 a ton in wire products has been announced, becoming effective December 11. It represents a total advance of $5 a ton above the low level of May, but leaves prices still $4 a ton below those prevailing before the panic. Apart from merchant pipe, in which an advance in the near future is considered likely, no other changes in finished materials are probable.

Heavy specifications in all lines are the chief feature of the closing month of the year, consumers who contracted early in 1909 at low prices seeking to reduce January 1 cancellations to a minimum.

A significant announcement by the American Sheet & Tin Plate Company is that it will begin at once the building of a sheet and tin plate plant at Gary, Ind., to cost $4,500,000. The company has increased its active tin mill capacity and now has 80 hot mills in operation. The new demand for sheets has been extremely heavy and delivery periods are lengthening with all producers.

Prospects for steel structural work continue promising, and December contracts are expected to bring the year's total up to 1,500,000 tons, of which about 40 per cent. has been taken by the leading interest. In the past week the Mandel Building at Chicago, 10,000 tons, was closed, and of pending business 6500 tons will be required for the Republic Iron & Steel Company's new construction at Haselton, Ohio, and 4500 tons for the American Rolling Mill Company's new plant at Middletown, Ohio.

Pacific Coast fabricators, having failed to secure a differential from the railroads on plain material, give out that they will buy foreign shapes. It is estimated that a total of 20,000 tons has been placed abroad, deliveries to be made in the spring of 1910.

Bridge work is not coming from the railroads in any large way for 1910, and rail business for the time being is light. Eastern mills have comparatively little in the way of backlog rail orders for next year. From Western roads the assurance comes of further good car orders soon after the opening of the new year.

Reports from Central Western markets indicate some easing of the stringency in billets and sheet bars. A sale of 4500 tons of sheet bars for the first quarter of 1910 was made at $28.50, at maker's mill. In the Chicago District users of forging billets are finding difficulty in making contracts for next year. In the East some sellers are filled up for four months. The absence of Eastern rail business may work out in a better billet supply.

Pig iron is weaker in foundry grades, which alone show any activity. In the Chicago District some resale iron is being offered on behalf of consumers who bought beyond their needs for this year. On one 3000-ton contract in the East competition resulted in a concession of 50 cents from prices recently held. Producers for the most part maintain a firm stand on deliveries in the first half of the new year. Ore and coke prices for 1910 are on a level that gives but a moderate margin on the present market for pig iron.

With but two exceptions all nonferrous metals have advanced in the week. Tin is again conspicuous in the list and lead has gone 20 points higher.

The associated steel mills of eastern Pennsylvania have reduced their offering price for heavy melting steel to $17, delivered. The mills are loaded up with scrap, with the possible exception of one.

A Comparison of Prices.

Advances Over the Previous Month in Heavy Type, Declines in Italics.

At date, one week, one month and one year previous.

	Dec. 15, 1909.	Dec. 8, 1909.	Nov. 10, 1909.	Dec. 16, 1908.
PIG IRON, Per Gross Ton:				
Foundry No. 2, standard, Philadelphia	$19.00	$19.00	$19.00	$17.25
Foundry No. 2, Southern, Cincinnati	*17.25*	17.75	17.75	16.25
Foundry No. 2, local, Chicago	19.00	19.00	19.00	17.35
Basic, delivered, eastern Pa.	*18.75*	18.75	19.00	16.75
Basic, Valley furnace	*17.00*	17.00	17.25	15.50
Bessemer, Pittsburgh	19.90	19.90	19.90	17.40
Gray forge, Pittsburgh	**17.40**	17.40	17.15	15.15
Lake Superior charcoal, Chicago	19.50	19.50	19.50	19.50
BILLETS, &c., Per Gross Ton:				
Bessemer billets, Pittsburgh	**27.50**	27.50	27.00	25.00
Forging billets, Pittsburgh	31.00	32.00	31.00	27.00
Open hearth billets, Philadelphia	30.60	30.60	30.60	26.20
Wire rods, Pittsburgh	**33.00**	33.00	32.50	33.00
Steel rails, heavy, at mill	28.00	28.00	28.00	28.00
OLD MATERIAL, Per Gross Ton:				
Steel rails, melting, Chicago	17.25	17.25	17.25	15.50
Steel rails, melting, Philadelphia	18.00	17.50	18.00	17.50
Iron rails, Chicago	*20.00*	20.00	20.50	19.50
Iron rails, Philadelphia	*20.50*	20.50	21.00	21.25
Car wheels, Chicago	18.50	18.50	18.50	16.00
Car wheels, Philadelphia	17.50	17.50	17.50	16.00
Heavy steel scrap, Pittsburgh	**18.25**	18.00	17.50	16.50
Heavy steel scrap, Chicago	16.00	16.00	16.00	15.00
Heavy steel scrap, Philadelphia	18.00	17.50	18.00	17.50
FINISHED IRON AND STEEL, Per Pound:	Cents.	Cents.	Cents.	Cents.
Refined iron bars, Philadelphia	1.65	1.65	1.65	1.52
Common iron bars, Chicago	**1.60**	1.60	1.55	1.50
Common iron bars, Pittsburgh	**1.70**	1.70	1.65	1.50
Steel bars, tidewater, New York	1.66	1.66	1.66	1.56
Steel bars, Pittsburgh	1.50	1.50	1.50	1.40
Tank plates, tidewater, New York	1.71	1.71	1.71	1.76
Tank plates, Pittsburgh	1.55	1.55	1.55	1.60
Beams, tidewater, New York	1.71	1.71	1.71	1.76
Beams, Pittsburgh	1.55	1.55	1.55	1.60
Angles, tidewater, New York	1.71	1.71	1.71	1.76
Angles, Pittsburgh	1.55	1.55	1.55	1.60
Skelp, grooved steel, Pittsburgh	**1.60**	1.60	1.50	1.45
Skelp, sheared steel, Pittsburgh	**1.65**	1.65	1.60	1.50
METALS, Per Pound:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York	**13.75**	13.75	13.25	14.50
Electrolytic copper, New York	**13.50**	13.37½	13.00	14.12½
Spelter, New York	**6.40**	6.37½	6.30	5.20
Spelter, St. Louis	**6.25**	6.20	6.15	5.05
Lead, New York	**4.60**	4.40	4.40	4.25
Lead, St. Louis	**4.52½**	4.30	4.25	4.10
Tin, New York	**32.80**	32.25	30.50	29.10
Antimony, Hallett, New York	8.25	8.12½	8.25	8.12½
Nickel, New York	45.00	45.00	45.00	45.00
Tin plate, 100 lb., New York	$3.74	$3.84	$3.74	$3.89
SHEETS, NAILS AND WIRE, Per Pound:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, Pittsburgh	**2.40**	2.40	2.30	2.50
Wire nails, Pittsburgh*	**1.85**	1.80	1.80	1.95
Cut nails, Pittsburgh	1.80	1.80	1.80	1.75
Barb wire, galv., Pittsburgh*	**2.15**	2.10	2.10	2.40

* These prices are for largest lots to jobbers.

Prices of Finished Iron and Steel F.O.B. Pittsburgh.

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16c.; Philadelphia, 15c.; Boston, 18c.; Buffalo, 11c.; Cleveland, 10c.; Cincinnati, 15c.; Indianapolis, 17c.; Chicago, 18c.; St. Paul, 32c.; St. Louis, 22½c.; New Orleans, 30c.; Birmingham, Ala., 45c. Rates to the Pacific Coast are 80c. on plates, structural shapes and sheets, No. 11 and heavier; 85c. on sheets, Nos. 12 to 16; 95c. on sheets, No. 16 and lighter; 65c. on wrought pipe and boiler tubes.

Structural Shapes.—I-beams and channels, 3 to 15 in., inclusive, 1.55c., net; I-beams over 15 in., 1.65c., net; H-beams over 8 in., 1.75c.; angles, 3 to 6 in., inclusive, ¼ in. and up, 1.60c., net; angles, over 6 in., 1.65c., net; angles, 3 x 3 in. and up, less than ¼ in., 1.75c., base, half extras, steel bar card; tees, 3 in. and up, 1.65c., net; zees, 3 in. and up, 1.60c., net; angles, channels and tees, under 3 in., 1.50c., base, plus 10c., half extras, steel bar card; deck beams and bulb angles, 1.80c., net; hand rail tees, 2.80c., net; checkered and corrugated plates, 2.80c., net.

Plates.—Tank plates, ¾ in. thick, 6¼ in. up to 100 in. wide, 1.55c. to 1.60c., base. Extras over this price are as follows:

Tank, ship and bridge quality, ¼-in. thick on edges, 100 in. wide, down to but not including 6 in. wide, is taken as base.

Steel plates up to 72 in. wide, inclusive, ordered 10.2 lb. per square foot, shall be considered ¼-in. plate. Steel plates over 72 in. wide must be ordered ¼-in. thick on edge, or not less than 11 lb. per square foot, to take base price. Steel plates over 72 in. wide, ordered less than 11 lb. per square foot down to the weight of 3-16-in. shall take the place of 3-16-in.

Percentages as to overweight on plates, whether ordered to gauge or weight, to be governed by the Association of American Steel Manufacturers' Standard Specifications.

Gauges under ¼-in. to and including 3-16-in. plates on thin edges	$0.10
Gauges under 3-16-in. to and including No. 8	.15
Gauges under No. 8 to and including No. 9	.25
All sketches (excepting straight taper plates varying not more than 4 in. in width at ends, narrowest end being not less than 30 in.)	.10
Complete circles	.20
Boiler and flange steel plates	.10
"A. B. M. A." and ordinary firebox steel plates	.20
Still bottom steel	.30
Marine steel	.40
Locomotive firebox steel	.50
Shell grade of steel is abandoned.	
For widths over 100 in. up to 110 in	.05
For widths over 110 in. up to 115 in	.10
For widths over 115 in. up to 120 in	.15
For widths over 120 in. up to 125 in	.25
For widths over 125 in. up to 130 in	.50
For widths over 130 in	1.00

TERMS.—Net cash 30 days. Pacific Coast base, 1.30c. f.o.b. Pittsburgh.

Sheets.—Minimum prices for mill shipments on sheets in carload and larger lots, on which jobbers charge the usual advances for small lots from store, are as follows: Blue annealed sheets, Nos. 3 to 8, 1.70c.; Nos. 9 and 10, 1.75c.; Nos. 11 and 12, 1.80c.; Nos. 13 and 14, 1.85c.; Nos. 15 and 16, 1.95c. Box annealed sheets, Nos. 17 to 21, 2.20c.; Nos. 22 to 24, 2.25c.; Nos. 25 and 26, 2.30c.; No. 27, 2.35c.; No. 28, 2.40c.; No. 29, 2.45c.; No. 30, 2.55c. Galvanized sheets, Nos. 13 and 14, 2.50c.; Nos. 15 and 16, 2.60c.; Nos. 17 to 21, 2.75c.; Nos. 22 to 24, 2.90c.; Nos. 25 and 26, 3.10c.; No. 27, 3.30c.; No. 28, 3.50c.; No. 29, 3.60c.; No. 30, 3.85c. Painted roofing sheets, No. 28, $1.70 per square. Galvanized roofing sheets, No. 28, $3 per square, for 2½-in. corrugations.

Wrought Pipe.—Following are the regular discounts on merchant pipe, subject to the usual additional discounts to larger buyers:

	Steel. Black.	Steel. Galv.	Iron. Black.	Iron. Galv.
⅛ and ¼ in	71	55	65	..
⅜ in	72	58	66	52
½ in	75	63	69	57
¾ to 6 in	79	69	73	63
7 to 12 in	74	59	68	53
Plugged and Reamed.				
1 to 4 in	77	67	71	61
Extra Strong, Plain Ends.				
⅛ to ¾ in	64	52	58	46
½ to 4 in	71	59	65	53
4½ to 8 in	67	55	61	49
Double Extra Strong, Plain Ends.				
⅛ to 8 in	60	49	54	43

Boiler Tubes.—Discounts on lap welded steel and charcoal iron boiler tubes to jobbers in carloads are as follows:

	Steel.	Iron.
1 to 1½ in	49	43
1¾ to 2¼ in	61	43
2½ in	63	48
2¾ to 5 in	69	55
6 to 13 in	60	43

2½ in. and smaller, over 18 ft., 10 per cent. net extra.
2¾ in. and larger, over 22 ft., 10 per cent. net extra.
To destinations east of the Mississippi River will be sold at delivered discounts for carloads lowered by two points for lengths 22 ft. and under; longer lengths, f.o.b. Pittsburgh.

Wire Rods.—Bessemer, open hearth and chain rods, $33.

Steel Rivets.—Structural rivets, 2.15c., base; boiler rivets, 2.25c., base, subject to usual extras.

Chicago.

FISHER BUILDING, December 15, 1909.—(*By Telegraph.*)

While the steel mills are taking good care of the current demand for finished products of general consumption, such as bars, sheets and wire products, the shortage of crude and semifinished steel west of the Alleghenies becomes more evident with the approach of the new year. Buyers of forging billets in 1000-ton lots have great difficulty in getting any mill represented in this market to contract for their business, and rolling billets are fully as scarce. Semifinished steel therefore commands a price in this market almost equal to bars. Specifications for finished products continue as heavy this month as in the preceding months, but new buying has fallen off, excepting in structural material. The new Mandel Building, another projected department store building, and office buildings under contract and projected, will make a large addition to the requirements in this market for structural shapes, and Western railroads are expected to come in soon after the first of the year with large orders for steel cars. This condition throws a new light on the conservative policy that the mills have maintained in the prices of finished products of general consumption, as these products are on a relatively lower level of values than heavy materials, like structural plates and shapes, which run into a larger tonnage and for which the demand is practically unlimited. In all lines there is difficulty in getting deliveries excepting for buyers who have specified their requirements the necessary time in advance, and it is hard to place new business. The general advance of $1 per ton in all common wire products, effective December 11, is regarded here as moderate under the circumstances. General conditions are steady and firm. Manufacturers in the West are getting more labor since winter set in, and practically every industry is running to its full capacity. Old material remains unchanged in value and is in fairly good demand, notwithstanding consumers have accumulated large stocks. In the metals the most notable change is in spelter, which is reported weaker. Lead, however, is higher.

Pig Iron.—The Northern iron market remains very firm and the furnaces apparently have no surplus iron to trouble them. Malleable Bessemer is particularly strong and in good demand, as the malleable foundries are getting more men and increasing their melt, and requests are becoming frequent for additional tonnage or anticipations of first quarter iron. Basic seems the only line of Northern iron in which any stock has accumulated in first hands, but even this grade remains relatively firm. In Southern iron $14, Birmingham, is the going price in this market for spot iron, but the market is saturated and sellers find it difficult to do any business. There is apparently not so much effort to sell warrant iron as the lots in weaker hands appear to have been cleaned out and the greater part of the warrant iron now held in Southern yards is owned by strong interests. The weakness comes from the efforts of brokers to accommodate foundries which bought more than they can take care of. When Southern iron was cheap last summer many buyers, alarmed at the remarkable revival in the steel industry, anticipated a similar advance in foundry iron and bought Southern iron far in excess of their consumptive needs for this year's delivery. Some of them are attempting to take a small profit by reselling and reconsigning their shipments through brokers, as they know that any low priced tonnage on which they have not given shipping orders before January 1 will be canceled. The scrap brokers, following the enormous business they have done this fall in their own field, have been quick to take advantage of the situation, as they are in close touch with the foundry interests. There has been some talk of steel foundries making large purchases of basic, but no tangible inquiries have developed, as Southern basic is relatively scarce and the furnaces are not offering bargains in this grade. It is understood, however, that the Southern cast iron pipe interests are figuring on a large tonnage. The strongest Southern furnace interests continue to ask $15, Birmingham, for No. 2 foundry, but with no prospect of doing business until the market is cleared of resale iron. The following prices are for December delivery, f.o.b. Chicago:

Lake Superior charcoal	$19.50 to $20.00
Northern coke foundry, No. 1	19.50 to 20.00
Northern coke foundry, No. 2	19.00 to 19.50
Northern coke foundry, No. 3	18.50 to 19.00
Northern Scotch, No. 1	19.00 to 19.50
Southern coke, No. 1	18.85 to 19.35
Southern coke, No. 2	18.35 to 18.85
Southern coke, No. 3	17.85 to 18.35
Southern coke, No. 4	17.60 to 18.10
Southern coke, No. 1 soft	18.85 to 19.35
Southern coke, No. 2 soft	18.35 to 18.85
Southern gray forge	17.35 to 17.85
Southern mottled	17.10 to 17.60
Malleable Bessemer	19.00 to 19.50
Standard Bessemer	21.40 to 21.90
Jackson Co. and Kentucky silvery, 6%	20.40 to 20.90
Jackson Co. and Kentucky silvery, 8%	21.40 to 21.90
Jackson Co. and Kentucky silvery, 10%	22.40 to 22.90

(*By Mail.*)

Billets.—Consumers of billets in the West have under consideration the question of contracts for the coming year, and are having difficulty in covering their requirements, as the mills in this district will not consider any business outside of taking care of old customers. There are no open prices in the Chicago market for either rolling or forging billets.

Rails and Track Supplies.—No new orders of any importance were booked in this market for standard rails the past week, but there was a fair volume of new business in light sections. It is understood that roads which have contracts with Chicago mills may take a considerable tonnage before the end of the year in the way of second orders, and enough business of this character will undoubtedly come along to keep the Chicago rail mills busy the coming year. Specifications for track supplies for spring shipment continue very heavy. We quote standard railroad spikes at 1.80c., base; track bolts and square nuts, 2.30c. to 2.50c., base, all in carloads, Chicago. Light rails, 40 to 45 lb., $26; 30 to 35 lb., $26.75; 16, 20 and 25 lb., $27; 12 lb., $28, Chicago, less 50c. a ton on lots of 500 tons and $1 a ton on lots over 500 tons.

Structural Material.—The American Bridge Company has taken the contract for the Mandel store, amounting to something over 10,000 tons. The same interest has also taken the steel contract for the Telephone Exchange office building, under a general contract which went to Wells Brothers, as reported last week. The American Bridge Company has also received the contract for a county jail at San Francisco, 815 tons. The Praeger Building at San

Francisco, 1600 tons, went to the Ralston Iron Works of that city, and the Denver Tramway Company's office building at Denver, 2000 tons, went to the Minneapolis Steel & Machinery Company, Minneapolis. Railroad specifications for bridge material are very heavy. It is understood that the Brooks Estate of Boston, which owns a number of large office buildings in Chicago, has under consideration plans for a new office building on Dearborn street, on the southeast corner of Monroe. We quote plain material from mill, 1.78c. to 1.88c., Chicago; from store, 2c., Chicago.

Plates.—It is understood that most of the steel for the Santa Fe car order will be rolled in the Chicago District, this heavy tonnage adding a new chapter to the difficulties that confront the plate mills. Car business from other roads, however, is not coming forward as rapidly as might be expected. The Duluth & Iron Range and the Duluth, Missabe & Northern have each ordered 1000 ore cars. The plate mills, however, will not be in need of any new business until far along in 1910. We quote mill prices at 1.78c. to 1.88c., Chicago; store prices, 2c., Chicago.

Sheets.—The volume of new business is not formidable, but there is relatively more of it in sheets than in bars and other products of general consumption, as consumers have not yet fully covered their requirements for the first half. Prices remain unchanged and the mills are not over anxious to commit themselves except with regular customers. We quote mill prices as follows, Chicago: No. 10 blue annealed, 1.93c.; No. 28 black, 2.58c.; No. 28 galvanized, 3.68c. Prices from store, Chicago, are: No. 10 blue annealed, 2.25c. to 2.35c.; No. 28 black, 2.90c. to 3c.; No. 28 galvanized, 4c. to 4.10c.

Bars.—There is little new business this month, but specifications continue very heavy, figuring about as large for December as for the same period in the preceding months. Buyers have generally covered all contracts on which specifications were due before the end of the year, and the mills will have little opportunity to cancel unfilled tonnage taken last summer for steel bars. The bar iron market is quiet, but the mills have a good comfortable tonnage booked for several months ahead, and the quotations of the leading mills are firmly held, although concessions can be had outside. On hard steel bars rolled from old rails, 1.58c., Chicago, is reported as the minimum. On very attractive tonnage for deferred delivery it is understood that 1.68c., Chicago, can be shaded on soft steel bars, as the Chicago market is likely to become independent of the Pittsburgh base price in the near future when the Gary mills are completed. It is estimated that the total capacity of the bar mills west of Ohio, including bar iron, is about 1,000,000 tons annually. The Gary merchant mills will add at least 60 per cent., and possibly more, to this total. Meantime, however, soft steel bars for spot shipment are very scarce. We quote as follows: Soft steel bars, 1.68c. to 1.78c.; bar iron, 1.60c. to 1.65c.; hard steel bars rolled from old rails, 1.58c. to 1.65c., all Chicago.

Merchant Steel.—Many of the agricultural implement manufacturers have found that they had not fully covered their requirements for the pending season for special lines of steel which they use so extensively, and they have recently placed additional orders on which the mills have had considerable difficulty in arranging satisfactory schedules for delivery. These consumers of special steels did a record breaking business last year, and they have every prospect of marketing a larger output this coming year. Prices in all lines of merchant steel are very firm.

Cast Iron Pipe.—The market is very quiet, as winter weather has checked the demand for spot shipment, and not much of next year's business has appeared on the horizon thus far. The city of Minneapolis, however, is in the market for 2500 tons of water pipe, to be let the latter part of this week. Not much business of magnitude is expected to develop until after the holidays. On current business we quote, per net ton, Chicago, as follows: Water pipe, 4-in., $28.50; 6 to 12 in., $27.50; 16-in. and up, $26.50, with $1 extra for gas pipe.

Metals.—The copper market has been steady, with practically no change in prices. It is understood that speculative lots which had exerted a depressing influence on the market have gone into consumption and prices are now firm for spot as well as for future deliveries. Pronounced weakness has developed in the spelter market this week. Last week consumers paid as high as 6.30c. and 6.35c. for carload lots, Chicago delivery, but on current carload business this week 6.25c. can be done, and the market is weak at this figure. It is understood that on round lots prices equivalent to 6.20c. or lower are available, but large consumers consider these prices too high. Liberal offers have been made for round lots at 6c., East St. Louis, but no reports are available of business done at this figure. Lead is 15c. per 100 lb. higher, and tin is also a shade stronger. Old metals are practically unchanged. We quote as follows: Casting copper, 13¼c.; lake, 13¾c., in carloads, for prompt shipment; small lots, ¼c. to ⅜c. higher; pig tin, car lots, 33½c.; small lots, 34c. to 35c.; lead, desilverized, 4.55c. to 4.65c., for 50-ton lots; corroding, 4.80c. to 4.90c., for 50-ton lots; in carloads, 2½c. per 100 lb. higher; spelter, 6.25c. to 6.30c.; Cookson's antimony, 10⅜c., and other grades, 9¾c. to 10¼c.; sheet zinc is $8, f.o.b. La Salle, in car lots of 600-lb. casks. On old metals we quote: Copper wire, crucible shapes, 13½c.; copper bottoms, 11½c.; copper clips, 13c.; red brass, 12½c.; yellow brass, 10c.; light brass, 7c.; lead pipe, 4½c.; zinc, 5.25c.; pewter, No. 1, 23c.; tin foil, 26c.; block tin pipe, 28c.

Old Material.—The market for scrap continues very quiet. A fair volume of material is changing hands without any marked fluctuations in value. Careful estimates of the movement the past fall make it appear that more business has been done in scrap in Chicago than in merchant pig iron, although the heavy scrap movement covered a period when large sales of foundry iron were made. This activity, however, was unusual in old material and represented a general clean-up on the part of the smaller country dealers. It is understood that the larger country dealers, while they have reduced their stocks somewhat, still hold a large tonnage, and this is true also of the large yard dealers in Chicago. Railroad offerings are lighter this month. The Santa Fe has a list of about 5000 tons, including 1700 tons of No. 1 wrought, and the St. Paul has sold about 1500 tons. Prices remain practically unchanged. For current lots on track the minimum figures quoted below represent the prices at which material is being delivered to consumers in the Chicago switching district, switching charges paid, while the higher figures represent prices asked by dealers for round lots, following the peculiar custom of the scrap market, which places a higher value on a round lot than on broken lots of a few cars. The following prices are per gross ton, f.o.b. Chicago:

Old iron rails	$20.00 to	$20.50
Old steel rails, rerolling	18.00 to	18.50
Old steel rails, less than 3 ft	17.25 to	17.75
Relaying rails, standard sections, subject to inspection	23.50 to	24.50
Old car wheels	18.50 to	19.00
Heavy melting steel scrap	16.00 to	16.50
Frogs, switches and guards, cut apart	16.00 to	16.50
Shoveling steel	15.50 to	16.00

The following quotations are per net ton:

Iron angles and splice bars	$17.50 to	$18.00
Iron car axles	21.50 to	22.00
Steel car axles	20.50 to	21.00
No. 1 railroad wrought	14.75 to	15.25
No. 2 railroad wrought	13.75 to	14.25
Springs, knuckles and couplers	14.75 to	15.25
Locomotive tires, smooth	18.25 to	18.75
No. 1 dealers' forge	12.50 to	13.00
Steel axle turnings	12.00 to	12.50
Machine shop turnings	10.50 to	11.00
Cast and mixed borings	7.50 to	8.00
No. 1 busheling	12.75 to	13.25
No. 2 busheling	9.75 to	10.25
No. 1 boilers, cut to sheets and rings	11.50 to	12.00
No. 1 cast scrap	15.00 to	15.50
Stove plate and light cast scrap	12.50 to	13.00
Railroad malleable	15.00 to	15.50
Agricultural malleable	13.00 to	13.50
Pipes and flues	11.50 to	12.00

Birmingham.

BIRMINGHAM, ALA., December 13, 1909.

Pig Iron.—Considerable activity has characterized the market the past week; several round lots of iron were sold for next year's delivery, as well as a fair tonnage for prompt or December shipment. One round lot was disposed of by one of the producing interests here on the basis of $14.50, at the furnace. The merchant iron on the several yards in the district has been moving at a pretty rapid rate, and it is generally known that some sales of this iron have been made on a basis of $14 at the furnace. It is not, however, thought that any considerable tonnage was disposed of at these figures, the bulk of the business being scattering carload lots. The true status of the market seems to be that for the first quarter some producers will sell at $14.50, at the furnace, while others will not sell on this basis; but for second quarter or first half business $15 is asked. As far as can be ascertained, no iron company in the district is yet willing to go into the market for second half or third quarter business; and we doubt seriously whether any firm offers for such delivery have been made. It is understood that the largest foundry iron buyer is in the market for more next year's iron, provided any one can be found who will offer a sufficiently attractive inducement. A seller might probably be asked to meet import iron prices to a certain degree. The largest pig iron producer in the district has withdrawn from the market and making no solicitations whatever. Charcoal iron is firmly quoted at $22 to $22.50, at the furnace, and satisfactory booking on this basis prevails.

Cast Iron Pipe.—There has been no advance so far in prices of cast iron pipe. One of the largest manufacturers here reports conditions good, with inquiries on the up-grade; also says that trade is holding up pretty well for the season. Satisfactory shipments are being made from time to time into the Middle West and extreme West. It is reasonable to suppose that there will be no advance until the supply is greater than the demand. Such is not the case at the present time. Municipalities and other consumers are busy,

making up their 1910 estimates at this time. Stocks are kept down, and shops are being run full time. We quote water pipe as follows per net ton, f.o.b. cars here: 4 to 6 in., $26; 8 to 12 in., $25; over 12 in., average, $24, with $1 per ton extra for gas pipe.

Old Material.—This market is exceedingly quiet. Dealers are not so eager to gather scrap as they have been in the recent past. Their yards are pretty well filled at present. Most consumers are unwilling to augment their supply on account of inventory time being at hand. Old steel rails seem to take precedence over other classes of old material, while strictly No. 1 steel is not sought. Wrought and cast scrap demand practically no consideration. Dealers seem inclined to wait until after the holidays and for the reaction in the pig iron market, which is looked for in the early part of 1910. Following are asking prices, with the accent on the minimum figures, per gross ton, Birmingham:

Old iron axles	$20.00 to $20.50
Old iron rails	16.00 to 16.50
Old steel axles	19.00 to 19.50
No. 1 railroad wrought	14.50 to 15.00
No. 2 railroad wrought	12.00 to 12.50
No. 1 country wrought	11.50 to 12.00
No. 2 country wrought	11.50 to 12.00
No. 1 machinery	13.00 to 13.50
No. 1 steel	12.25 to 12.75
Tram car wheels	12.50 to 13.00
Standard car wheels	14.50 to 15.00
Light cast and stove plate	10.50 to 11.00
Cast borings	6.50 to 7.00

Philadelphia.

PHILADELPHIA, PA., December 14, 1909.

The local market is rapidly developing the usual year end characteristics. Buyers come into the market when urgent requirements demand, but business is pretty generally deferred until after the first of the year. There has been little movement in any grade of pig iron. Continued inactivity has given the market an easier appearance, although the undertone is strong and prices are practically unchanged. New business in rolled products has not been quite so large, although specifications on contracts come out freely, and mills are, in almost every case, well supplied with orders. Billets continue active, with Eastern mills booking good orders for Western delivery. Sharp premiums are paid for prompt billets as well as for sheets. A gradually diminishing demand for all classes of both crude and finished products is, however, expected until after the turn of the year. Old material shows no movement, a waiting market having developed.

Pig Iron.—The most interesting feature of the market is the continued heavy deliveries being made by producers on orders in hand. Buyers are taking iron freely, although in some few instances the urgency for shipments is less pronounced, this being more particularly noticeable in basic iron. Stocks are being accumulated by some melters, but very few are reported as having as much iron on their yards as has heretofore been their custom to carry. Eastern producers of pig iron are in a comparatively strong position, a large number of furnaces being well sold ahead, and stocks on the furnace banks show little tendency to increase. Sales during the past week have been extremely light; consumers are covered for near future requirements, and the bulk of the orders placed have been for spot shipment. Foundry iron transactions have been largely by the carload, although one sale of 600 tons and another of 1200 tons of No. 2 plain for early next year shipment have been reported. Prices of standard brands are well maintained, No. 2 X foundry ranging from $19 to $19.25, delivered in this vicinity, with No. 2 plain 50c. under those figures. Less well known grades, however, could probably be had in some instances slightly under these quotations. Low grade foundry irons are less actively inquired for, although, as is usually the case, cast iron pipe foundries would take on tonnage at prices satisfactory to the buyers. Little inquiry is noted for Virginia foundry irons. Sales have been small and unimportant, usually carload lots for early delivery, for which prices are firm at $16, furnace, for No. 2 X, equal to $19 to $19.25, delivered, in this vicinity. Southern foundry iron shows no movement in this territory. While it is reported that resale iron for prompt and early next year's delivery is being offered at $14 to $14.50, Birmingham, for No. 2 foundry, no actual business has come to light here, prices being as a rule too high to interest buyers, while Northern irons can be had for satisfactory delivery at the ruling quotations. Forge iron shows continued inactivity; few furnaces have any quantity of this grade to offer, and mills are fairly well supplied for near future requirements. Prices are firm, however, $17.50, furnace, being freely maintained by the leading producers. More inquiry is noted for low phosphorus iron, the greater proportion, however, coming from Western buyers. No sales of standard low phosphorus have been reported, although one lot of 600 tons of misfit iron was sold. Little is heard regarding further importations of pig iron; melters show no disposition to consider purchases, although interest is shown in the probable disposition of foreign iron to arrive, understood to be for merchants' account. While the general iron market continues dull, the undertone in this territory is strong and prices, particularly for leading brands, are being well maintained, the following quotations ruling for early 1910 delivery in buyers' yards, eastern Pennsylvania and nearby points:

Eastern Pennsylvania, No. 2 X foundry	$19.00 to $19.25
Eastern Pennsylvania, No. 2 plain	18.50 to 18.75
Virginia, No. 2 X foundry	19.00 to 19.25
Virginia, No. 2 plain	18.50 to 19.00
Gray forge	17.75 to 18.25
Basic	18.75
Low phosphorus	22.75 to 23.25

Ferromanganese.—While sales of some moderate quantities for Western delivery in the first and last half of next year at slightly better prices are reported, business in this immediate territory has been practically at a standstill, and quotations in the absence of sales are nominally $45 to $46, Baltimore, for delivery the coming year.

Billets.—Some new business comes out almost every day. Orders ranging from small lots to several thousand tons, for first quarter shipment, are being secured by Eastern mills, whose books now are in quite satisfactory shape. Considerable inquiry still comes from Western consumers, and some good orders for such delivery have recently been taken. Buyers are also endeavoring to get mills to accept orders for extended shipments; so far, however, little business on which delivery runs beyond the first quarter has been taken. Ordinary rolling billets are firm at $30, Eastern mill, equivalent to $30.60, delivered at nearby points. Forging billets range from $32 to $34, Eastern mill, dependent on specifications and analysis. For prompt shipment, premiums ranging from $3 to $4 a ton are readily obtained for both rolling and forging billets.

Plates.—Mills are still operating at top capacity, there being no diminution in the specifications coming to makers. Few are in a position to take on further business of any size and still make reasonable deliveries. The majority of the producers refuse to accept business for delivery beyond April 1, although in cases of special customers small contracts for more extended shipment have been made, and in some instances at advanced prices. Makers are inclined to refuse to quote on inquiries coming from consumers outside of regular customers, particularly where the delivery is somewhat extended. Prices are being firmly maintained, ordinary plates for first quarter shipment being quoted at 1.75c. to 1.80c., delivered in this territory, according to quantity and specifications.

Structural Material.—The market is a shade quieter, the bulk of the business recently being of a rather miscellaneous character. Bids for the substructure of the Vine street pier in this city have been opened, awards being expected in a few days. About 1000 tons of shapes will be required. Bids on a proposed hotel in Reading, Pa., were considered too high, and we understand that plans are to be revised. While makers and fabricators are interested in some large work to be given out in other districts, that developing in this vicinity is mostly of the smaller class. Deliveries on the part of some mills are probably less delayed, although shipments on nearly all classes of materials are far from satisfactory. Quotations for plain shapes are strong, 1.75c. to 1.80c. being named for deliveries in this territory, dependent on specifications.

Sheets.—There is a good current demand, and mills are fully engaged. Makers will now accept orders for first quarter delivery, but stocks of prompt sheets are rapidly declining, and the tendency is to accommodate regular customers rather than accept new business. For first quarter delivery prices are unchanged; for prompt shipment, however, premiums are readily obtained. The following quotations are named for reasonably early delivery: Nos. 18 to 20, 2.70c.; Nos. 22 to 24, 2.80c.; Nos. 25 and 26, 2.90c.; No. 27, 3c.; No. 28, 3.10c.

Bars.—The market has a trifle better tone. A fair volume of business comes out and the majority of the leading producers have firmed up a bit on prices, which, however, are quotably unchanged. In a measure the situation has somewhat of a waiting appearance, and business will probably fall off toward the close of the year. Refined iron bars for early shipment are quoted at 1.65c. to 1.75c., delivered in this territory, dependent on specifications. Steel bars are still held at 1.65c. to 1.70c., delivered, but ordinary sizes are not to be had for early shipment.

Coke.—The market still has an easy appearance, and quotations show a little wider range, dependent on individual sellers' views. Sales of furnace coke for first half shipment have been made at prices around $2.65 to $2.75 per net ton, at oven, while foundry coke for the same delivery has been sold at prices ranging from $3.10 to $3.25, at oven. For delivery in this territory the following quotations are named, per net ton:

Connellsville furnace coke	$4.90 to $5.10
Foundry coke	5.30 to 5.50
Mountain furnace coke	4.50 to 4.60
Foundry coke	4.90 to 5.10

Old Material.—Extreme dullness characterizes the market, there being no movement in any grade. Further developments are awaited in the heavy steel scrap situation;

meanwhile mills are receiving more deliveries on old orders than they can accommodate and embargoes are on at some of the mills, while large numbers of cars await unloading at others. The associated mills maintain their $18 price, delivered, for No. 1 heavy melting steel, which quotation flatly represents the market. Rolling mill grades of scrap are freely offered, but mills appear to be well supplied and refuse to purchase. Specialties of the higher grades are inactive and are nominally quoted. Prices generally show little change, in many cases insufficient business having been done to make a market. The following range of quotations, while to a large extent nominal, is named for prompt deliveries in buyers' yards, eastern Pennsylvania and nearby points:

No. 1 steel scrap and crops	$18.00
Old steel rails, rerolling	$18.50 to 19.00
Low phosphorus	23.00 to 23.50
Old steel axles	24.00 to 25.00
Old iron axles	30.00 to 31.00
Old iron rails	20.50 to 21.50
Old car wheels	17.50 to 18.00
Choice No. 1 R. R. wrought	19.50 to 20.00
Machinery cast	17.50 to 18.00
Railroad malleable	17.50 to 18.00
Wrought iron pipe	16.50 to 17.00
No. 1 forge fire scrap	16.50 to 17.00
No. 2 light iron	10.75 to 11.25
Wrought turnings	14.00 to 14.50
Stove plate	13.25 to 14.25
Cast borings	12.00 to 12.50
Grate bars	14.50 to 15.00

H. C. Matlack, formerly with Frank Samuel, and G. Walter Bates of Wilson & Bates, bar iron merchants, have formed a partnership under the name of Matlack & Bates, with headquarters at 1119 Pennsylvania Building, Philadelphia, for the sale of pig iron and coke.

Pittsburgh.

PARK BUILDING, December 15, 1909.—(*By Telegraph.*)

Pig Iron.—Aside from a sale of 1500 tons of Bessemer iron for first quarter at $19, Valley furnace, and two or three small lots of low phosphorus iron on the basis of about $23.75, Pittsburgh, nothing has been done. A Cleveland interest is reported in the market for 2500 tons of standard Bessemer for first quarter, and some Western consumers are inquiring for 8000 to 10,000 tons of malleable Bessemer. The situation is likely to continue quiet, and without special feature until after the first of the year. We quote standard Bessemer iron, $19, for delivery over first half of next year; basic, $17, for delivery in first quarter; malleable Bessemer, $17.25; No. 2 foundry, $17, and gray forge, $16.50, all at Valley furnace, the freight rate to the Pittsburgh District being 90c. a ton.

Steel.—Offerings of billets and sheet and tin bars are more liberal, and prices are somewhat easier. A prominent sheet mill has bought a round tonnage of sheet bars for first quarter delivery at a shade under $29, and we note another sale of 4500 to 5000 tons of sheet bars for first quarter at $28.50, maker's mill. Open hearth billets and high carbon steels continue scarce, and are held at high prices. This is also true of small billets rolled from open hearth stock. Bessemer billets are about $27.50, but small lots for prompt shipment might be picked up at slightly less; open hearth $28.50. Sheet and tin bars are held at about $29, but favored customers have been able to do slightly better. Forging billets are scarce and firm at $31 to $32, Pittsburgh.

(*By Mail.*)

Aside from an advance of $1 a ton in wire products, announced by the American Steel & Wire Company and the Pittsburgh Steel Company, effective from Saturday, December 11, there has been no change in prices during the week and nothing of special moment has occurred. The whole steel market is showing a seasonable quietness. The one disappointing feature in the situation is that the railroads are not buying as heavily of equipment as expected, and new tonnage entered this month by the mills has been relatively small. However, a great many contracts on finished material expire on the last day of this month and consumers are specifying freely to avoid cancellation. The coke market has slowed down to some extent, prices being lower on furnace coke for first half of the year shipment. The scrap market is firmer, and more tonnage is being sold by dealers than was generally expected at this time of the year.

Ferromanganese.—There is little new buying, and no large inquiries are in the market. We quote 80 per cent. foreign ferro at $44.50 to $45, seaboard, for first half of the year delivery, and $45.50 to $46 for second half.

Ferrosilicon.—No important sales were made during the week, new demand being quiet, but prices are firm. We quote 10 per cent. at $23.90; 11 per cent., $24.90; 12 per cent., $25.90, and 50 per cent., $63.50 to $64, Pittsburgh, for reasonably prompt shipment.

Muck Bar.—There is not much new demand, consumers being pretty well covered and out of the market as buyers until after the first of the year. Prices continue firm, and we quote best grades of muck bar in random lengths made from all pig iron at $30 and light bars cut to lengths at $30.25, Pittsburgh.

Wire Rods.—There is not much new demand, but the available supply of rods for the open market is limited. The two leading makers are practically out of the market as sellers, needing all the rods they make for their own use and to fill contracts already on their books. We quote Bessemer, open hearth and chain rods at $33, Pittsburgh.

Skelp.—The demand continues unusually active for skelp for this season of the year, and the mills rolling it are pretty well filled up for several months. Prices are firm, with one leading maker quoting about $2 a ton advance over the regular market for delivery in first quarter of next year. We quote grooved steel skelp 1.60c. to 1.65c.; wide steel skelp in sheared sizes, 1.65c. to 1.70c.; grooved iron skelp, 1.80c. to 1.85c.; sheared sizes of wide iron skelp at 1.90c. to 2c., f.o.b. at mill, Pittsburgh.

Steel Rails.—The Carnegie Steel Company received quite a number of small orders last week for standard sections, ranging from 500 tons to 1000 tons, but took no large orders. The same company received new orders for 3700 tons of light rails and specifications against contracts for over 1100 tons. We quote steel axles at 1.75c. to 1.80c., and splice bars, 1.50c., at mill, Pittsburgh. Light rail prices are as follows: 8 to 10 lb., $32; 12 to 14 lb., $29; 16, 20 and 25 lb., $28; 30 and 35 lb., $27.75, and 40 and 45 lb., $27, Pittsburgh. These prices are for 250-ton lots and over, and for small lots premiums of 50c. per ton and more are being paid. We quote standard sections at $28, at mill.

Plates.—The principal consumption of plates just now is by the steel car companies, which are filled up with orders for the next three or four months, and are specifying liberally. Prices are firm, and one leading Western maker is now quoting on the basis of 1.60c. minimum, at mill. We quote ¼-in. and heavier plates at 1.55c. in large lots, and 1.60c. to 1.65c. in small lots.

Structural Material.—The two leading jobs in the market include 6500 tons for the new open hearth steel plant of the Republic Iron & Steel Company, at Youngstown, and 4500 tons for new steel buildings for the American Rolling Mill Company, at Middletown, Ohio. These two jobs are likely to be placed this week, bids having gone in some time ago. Specifications against contracts for plain material placed some time ago, when prices were lower than they are now, are coming in freely this month, as many of these contracts expire December 31, and all unspecified tonnage will be canceled. We quote beams and channels up to 15-in. at 1.55c., at mill, and small lots for spot shipment at 1.60c. to 1.65c., at mill.

Tin Plate.—The new demand for tin plate continues fairly active, but most of the large contracts for the salmon packing and meat interests were placed some time ago, and specifications against these contracts are coming in freely. The American Sheet & Tin Plate Company continues to increase its active list of hot tin mills, and this week is running about 80 per cent. of serviceable capacity. Prices are firm and we continue to quote 100-lb. cokes at $3.60 per base box, f.o.b. Pittsburgh, for delivery in first half of next year.

Sheets.—The Aetna-Standard Works of the American Sheet & Tin Plate Company, at Bridgeport, Ohio, containing 23 hot mills, and which was the scene recently of riot and disorder, is still closed, the company having made no further attempts to start the mill. The new demand for sheets continues extremely active, and specifications against contracts are pouring into the mills at an unprecedented rate. None of the sheet mills is in position to promise deliveries on new orders inside of six weeks to three months or longer. The demand for sheets for electrical purposes is referred to as being especially heavy. Prices continue firm and we quote: Blue annealed sheets, Nos. 3 to 8, 1.70c.; Nos. 9 and 10, 1.75c.; Nos. 11 and 12, 1.80c.; Nos. 13 and 14, 1.85c., and Nos. 14 and 15, 1.95c.; one-pass box annealed No. 28 black sheets, 2.40c., and No. 28 galvanized, 3.50c., at mill. We quote corrugated roofing sheets at $1.70 per square for painted and $3 for galvanized, 2½-in. corrugations. Jobbers charge the usual advances over these prices for small lots from store.

Bars.—New orders for both iron and steel bars are not coming in as freely as they did some time ago, but specifications against contracts are being received on an enormous scale, and all the leading mills are far behind in deliveries. Mills rolling iron and steel bars that are in position to make shipments within three to six weeks from date of order can get premiums of about $2 a ton over regular prices. We quote steel bars at 1.50c. to 1.55c., for delivery within three or four weeks, and in some cases 1.60c., at mill, is being paid for prompt shipments. On contracts from regular customers the mills are still entering orders for steel bars at

about 1.45c., at mill, for delivery in first and second quarters of next year. We quote iron bars at 1.70c. to 1.75c., Pittsburgh, for reasonably prompt shipment.

Hoops and Bands.—The new demand has quieted down somewhat, but specifications against contracts continue to come in freely, and are expected to be especially heavy this month, as a good many contracts expire December 31, on which the mills will cancel all unspecified tonnage. We quote steel hoops for forward delivery at 1.50c. to 1.55c., and for prompt shipment at 1.60c. to 1.65c., at mill. Steel bands are firm at 1.45c. to 1.50c., on contracts for forward delivery, and 1.55c. to 1.60c. for reasonably prompt shipment.

Spelter.—The demand for spelter has fallen off somewhat, and prices are slightly lower. We quote best grades of prime Western at 6.20c., East St. Louis, equal to 6.32½c., Pittsburgh. A consumer reports a purchase last week of 50 tons at this price.

Spikes.—There is a good general demand from the railroads for moderate orders, but no large contracts have recently been placed. The mills are pretty well filled up with orders for several months of next year. We quote standard sizes of railroad spikes, 4½ x 9-16 in. and larger, at $1.80 to $1.85 for first quarter. Boat spikes are firm at $1.80, base, and small railroad spikes at $1.80, base. These prices are for carload and larger lots, 10c. per keg advance being charged for small lots.

Shafting.—The new demand for shafting is only fairly active, but consumers are specifying freely against contracts, a good many of which expire on the last day of this month, on which the mills will cancel all tonnage not taken out. The Republic Iron & Steel Company is operating its shafting department night and day, and is filled up with orders for some time ahead. We are advised that present discounts on shafting are being firmly maintained on the basis of 55 per cent. off in carload and larger lots, and 50 per cent. off in less than carload lots, delivered in base territory.

Rivets.—The new demand at the recent advance in prices is only fair, but consumers are specifying freely on orders previously placed. We quote: Structural rivets, ¾ in. and larger, 2.15c., base; cone head boiler rivets, ¾ in. and larger, 2.25c., base; ⅝ in. and 11-16 in. take an advance of 15c., and ½ in. and 9-16 in. take an advance of 50c.; in lengths shorter than 1 in. also take an advance of 50c. Terms are 30 days, net cash, f.o.b. mill. The above prices are absolutely minimum on contracts for large lots, makers charging the usual advances of $2 to $3 a ton to the small trade.

Merchant Pipe.—Mills report a fairly active new demand for merchant pipe, and buyers are specifying liberally on orders placed some time ago. It is intimated, but not officially confirmed, that the long expected advance in prices of steel pipe may be made before the first of the year. We are advised that regular discounts on both iron and steel pipe, printed elsewhere in this issue, are being absolutely maintained.

Boiler Tubes.—There is a fair amount of buying of locomotive tubes by the railroads, and some large inquiries are in the market which are expected to be closed soon after the first of the year. The demand for merchant tubes is better than it has been at any time for some months, and the mills are pretty well filled up. Regular discounts on locomotive and merchant tubes are being maintained.

Iron and Steel Scrap.—Very little of the scrap material included in the lists of the Baltimore & Ohio, Pennsylvania and Erie railroads were secured last week by local dealers, as their bids were not high enough, they being unwilling to take chances on this scrap by paying high prices for it and then holding it until after the first of the year. We note a very active demand for heavy steel scrap, and it is being picked up, especially by one leading local consumer, about as fast as offered. We quote heavy steel scrap for delivery at leading consuming points, such as Monessen, Steubenville, Sharon, Follansbee, Brackenridge and Pittsburgh, at $18.25 to $18.50, delivered. We note that No. 1 cast scrap continues weak, and while it is held at about $16.50 and No. 2 at about $15.50, sales have been made at slightly lower prices. A material improvement in the general demand for scrap is expected soon after the first of the year, but dealers look for the situation to continue relatively quiet for the balance of this month. On other grades of scrap dealers quote as follows: Low phosphorus melting stock, $21 to $21.25; bundled sheet scrap, $16.25 to $16.50; rerolling rails, $18.50 to $18.75, for delivery at Cumberland, Md., Cambridge or Newark, Ohio; railroad malleable, $16 to $16.25; No. 1 busheling, $15.50; No. 2, $12.50; grate bars, $14 to $14.25; locomotive axles, $28 to $28.25; iron axles, $27.25 to $27.50; steel axles, $21.50 to $21.75; No. 1 railroad wrought scrap, $19 to $19.50; old car wheels, $18 to $18.25; cast iron borings, $10.50 to $11.75; machine shop turnings, $13; sheet bar crop ends, $18.75 to $19. All the above prices are per gross ton, f.o.b. Pittsburgh.

Coke.—For some weeks the output of coke in the Connellsville and Klondike regions has been running close to 450,000 tons a week, or over 20,000,000 tons a year. This enormous output is commencing to tell and offerings of furnace and foundry coke for first half of the year delivery are freer than for some time; prices on standard makes of furnace coke for first half of the year are, therefore, slightly lower. A leading furnace interest in the East has closed recently for 10,000 tons or more of furnace coke on the basis of $2.65 per net ton, at oven. Makers of Connellsville and other standard grades of furnace coke are holding for $2.75 to $2.80 per net ton, at oven. We quote best makes of 72-hour foundry coke for first half of the year delivery at $3.25 to $3.50 per net ton, at oven.

Cincinnati.

CINCINNATI, OHIO, December 15, 1909.—(*By Telegraph.*)

Although not usual at this stage of the year, there is a distinct note of improvement in the general situation over last week, particularly noticeable in the pig iron and coke markets. This, however, is unevenly distributed, for locally, where the holiday dullness is on, there is no marked improvement in either crude or finished lines. It is the outlying districts that furnish evidences of business and brighter prospects for the new year. The weather conditions, which delay coke and iron carriers, have conduced to brace up somewhat a sagging market. All selling offices report shipments going forward well on finished material contracts. The machine tool industry will close the year under most promising conditions.

Pig Iron.—The market is quiet, but there is a better feeling among sellers than at this time last week. There seems to be no weakening on the part of the Southern furnaces, and the price of $14.50, Birmingham, for No. 2 is rather well established for first quarter and even first half delivery. For prompt deliveries, in the absence of any transactions of sufficient size to test the market, it is tacitly conceded that a firm offer of $14 for reasonably immediate delivery would result in business. The Ohio furnace operators maintain a show of independence, but prices have weakened a trifle, and standard irons can be bought for first half delivery on the basis of $17, Ironton, for No. 2. In cases where the asking price of a furnace has been $17.50, $17.25 can be done, but it is not probable that there will be any further concessions from producers who seem to be in excellent shape to endure the holiday dullness. There is a little Northern resale iron on the market, but nothing better is heard than $17, at furnace, for this. The largest inquiry in the market to-day is for 2000 tons of malleable from Michigan for first half delivery. The price of malleable is $17.50, Ironton, and 500 tons of this iron are reported sold in Milwaukee at this figure. The largest pipe interest is again in the market and for low grades, No. 4 foundry and forge, principally. A local seller has some forge to-day to offer at $13.25 for first quarter. A melter in central territory is inquiring for some Northern and Southern iron for immediate shipment, and for prices on 500 tons of either for the first half. Another melter in this territory is feeling the market for 1000 tons of a certain analysis foundry grade running 2 per cent. and over in silicon for first half shipment. Production in the South shows no diminution as the holidays approach, and the only furnace of those in blast the first of the month reported idle is the Chattanooga stack, which is out for a few days for minor repairs. For delivery the remainder of the year and for first quarter, based on freight rates of $3.25 from Birmingham and $1.20 from Ironton, we quote as follows:

Southern coke, No. 1 foundry	$17.75 to $18.25
Southern coke, No. 2 foundry	17.25 to 17.75
Southern coke, No. 3 foundry	16.75 to 17.25
Southern coke, No. 4 foundry	16.50 to 16.75
Southern coke, No. 1 soft	17.75 to 18.25
Southern coke, No. 2 soft	17.25 to 17.75
Southern gray forge	16.50
Southern mottled	16.25
Ohio silvery, 8 per cent silicon	20.20
Lake Superior coke, No. 1	18.70 to 19.20
Lake Superior coke, No. 2	18.20 to 18.70
Lake Superior coke, No. 3	17.70 to 18.20
Standard Southern car wheel	24.75 to 25.25
Lake Superior car wheel	21.75 to 22.25

(*By Mail.*)

Coke.—It is expected that the sudden change in the weather will have a beneficial effect on the spot market. In general, coke is without change, with production holding its own and shipments moving freely. Some manipulation of spot furnace coke in the Virginia field had a tendency to soften prices a little on that product. The car shortage is still a factor. A reported price of $2 per net ton, at oven, and as low as $1.90, on Wise County furnace coke for immediate delivery cannot be confirmed. The best spot price heard to-day is $2.10. Connellsville furnace grades are quoted at $2.85 to $2.90 per net ton, at oven on spot business; on contract, $2.90 to $3. There is no change in the Pocahontas situation. Connellsville foundry is quotable at $3.25 to $3.50 per net ton, at oven, for both early and forward delivery. Wise County foundry grades are bringing $3 to $3.25, spot or contract. New River brands of furnace coke are quoted at $2.50 to $2.65; foundry, $2.75 to $3.50.

Shapes, Plates and Sheets.—In a jobbing way, the

first half of December will show better returns than the same period of November, which is somewhat unusual. Little or no contracting is being done, but specifications on contracts are good. Structural material out of yards is selling at 2c. The latest contract placed is that of about 100 tons for the Helming-McKenzie shoe factory, which was secured by Davis & Siehl, local contractors. Sheets continue strong, and specifications on contracts with mills in this territory are uniformly good. There is a growing disinclination to quote beyond the first quarter, although some contracts have been made for the second.

Steel and Iron Bars.—Steel bars for delivery in this territory are quotable at 1.65c. to 1.75c.; specifications on contract are coming out freely, but such bars for prompt shipment are scarce. The threatened cancellation on December 31 of any part of contracts expiring then on business taken when prices were much lower has a tendency to stimulate shipment orders. Dealers are getting 1.90c. for steel bars out of stock. Bar iron is quotable at 1.60c., local mills, and dealers are getting 1.75c. out of stock.

Old Material.—The market is weak, but dealers are optimistic and are buying freely. Some inquiries are coming in from the mills. There are also some good inquiries for relayers. The Norfolk & Western list, amounting to about 1000 tons, is the last offering from the railroads and is announced to close on the 15th, at the headquarters in Roanoke, Va. Dealers disagree on the question of prices, and in the absence of enough buying to effect the market materially the following are given as about representative of general conditions, and are f.o.b. Cincinnati:

No. 1 R. R. wrought, net ton	$14.00 to $14.50
Cast borings, net ton	8.00 to 8.50
Heavy melting steel scrap, gross ton	15.00 to 15.50
Steel turnings, net ton	9.00 to 9.50
No. 1 cast scrap, net ton	13.50 to 14.00
Burnt scrap, net ton	10.00 to 10.50
Old iron axles, net ton	18.50 to 19.00
Old iron rails, gross ton	18.00 to 18.50
Old steel rails, short, gross ton	15.00 to 15.50
Old steel rails, long, gross ton	16.00 to 16.50
Relaying rails, 56 lb. and up, gross ton	22.00 to 22.50
Old car wheels, gross ton	15.50 to 16.00
Low phosphorus scrap, gross ton	17.50 to 18.00

St. Louis.

ST. LOUIS, December 13, 1909.

As far as the iron trade is concerned, business is ruling quiet. Coke also is dull. The near approach of the close of the year will each week tend to curtail transactions, especially for prompt shipment, except for small lots. Owing to the inclement weather conditions, building is largely suspended except where the buildings are roofed in. In view of the fact that all these circumstances were expected and are normal at this season of the year in this section, it means merely a postponement of general activity until after New Year's in part, and for other interests until snow and ice will not interfere. The outlook for 1910 continues to grow brighter and preparations will increase for taking care of a record breaking business in all staple lines.

Coke.—Business is drifting into the mere supplying of the class of trade that are quite frequently in the market because their requirements are small and price basis is not important, and this condition is likely to prevail for the next three weeks. Lack of demand from large buyers is bringing about a softening in the market, and, in instances, offerings for early shipment are being shaded from 25c. to 50c. per ton. However, for round lots for forward shipment prices remain unchanged and firm, though the market is dull. We quote, nominally, standard 72-hour foundry for prompt shipment $3.25; for shipment over the first half of 1910, $3.50 per net ton, f.o.b. oven, Connellsville.

Pig Iron.—As the close of the year approaches the dullness in pig iron, so far as inquiry for round lots is concerned, is more generally reported. The only inquiries mentioned for the past week, outside of those made by small consumers, are for 300 to 500 tons of car wheel iron for early shipment and for 5000 tons of basic for shipment over the second quarter of 1910, the latter coming from interests that were recently in the market for the same quantity for the first quarter for shipment into St. Louis territory. As in other markets, steel making irons are ruling the strongest in tone, while Southern iron, which is also of a more speculative character, shows some weakness incident to the letting up in the demand from large consumers. Very few furnaces are reported to have shown an inclination to shade prices and such as are quoting lower are not disposed to be anxious sellers or to book large lots for forward shipment. Brokers are not pressing iron on the market and in some cases merchant sellers have called in their traveling men until after New Year's. We continue our quotations of last week, though for prompt shipment small lots can be bought for 50c. per ton less in the case of Southern iron. Southern No. 2 foundry for shipment over the first half of 1910 is held at $15 per ton, f.o.b. Birmingham.

Lead, Spelter, &c.—Lead is steady at 4.30c.; spelter is weak and dull at 6.15c., East St. Louis; zinc ore is slow at $50 per ton, Joplin base; tin is up $1 per 100 lb.; antimony, unchanged; copper, unchanged. The demand for finished metals is fair.

Old Materials.—Leading dealers state there is at present no business passing or any immediate prospect of improvement in demand or in prices. The whole list is weak and lower. The only railroad list reported for the past week is that of the Wabash Railroad, 700 tons. Specifications on previous contracts are about all that for the moment is engaging the attention of the trade. We quote dealers' prices as follows, per gross ton, f.o.b. St. Louis:

Old iron rails	$16.50 to $17.00
Old steel rails, rerolling	15.00 to 15.50
Old steel rails, less than 3 ft	14.00 to 14.50
Relaying rails, standard sections, subject to inspection	25.00 to 25.50
Old car wheels	17.50 to 18.00
Heavy melting steel scrap	14.00 to 14.50
Frogs, switches and guards, cut apart	14.00 to 14.50

The following quotations are per net ton:

Iron fish plates	$14.00 to $14.50
Iron car axles	20.00 to 20.50
Steel car axles	19.00 to 19.50
No. 1 railroad wrought	14.00 to 14.50
No. 2 railroad wrought	13.00 to 13.50
Railway springs	13.00 to 13.50
Locomotive tires, smooth	15.50 to 16.00
No. 1 dealers' forge	10.50 to 11.00
Mixed borings	7.00 to 7.50
No. 1 busheling	11.00 to 11.50
No. 1 boilers, cut to sheets and rings	10.00 to 10.50
No. 1 cast scrap	13.50 to 14.00
Stove plate and light cast scrap	10.00 to 10.50
Railroad malleable	12.00 to 12.50
Agricultural malleable	10.00 to 10.50
Pipes and flues	10.00 to 10.50
Railroad sheet and tank scrap	9.50 to 10.00
Railroad grate bars	9.50 to 10.00
Machine shop turnings	9.50 to 10.00

Negotiations are pending between the city of St. Louis and the Terminal Association concerning the abolition of grade crossings. The railroad company has submitted a proposition looking to the building of four viaducts, two at once and two within three years.

The Manufacturers' Railway last week announced a project for a new trunk line into St. Louis from the Southwest, to supplement a belt railroad around East St. Louis, and a $3,000,000 passenger and freight terminal in South St. Louis, on while latter enterprise considerable progress has already been made. The belt line railroad around East St. Louis has progressed to the signing of operating arrangements with the Illinois Terminal Railroad Company. The terminals in St. Louis have progressed to the point at which a franchise has been granted by the city permitting the crossing of streets and alleys, and about $1,000,000 worth of real estate has already been purchased and additional acquirements are being made constantly. Among the capitalists behind this enterprise is Adolphus Busch, the prominent brewer, with whom it is a pet project.

San Francisco.

SAN FRANCISCO, December 8, 1909.

December has opened more quietly in all departments than the previous mouth, but the volume of new business coming out still greatly exceeds that of a year ago. The market is quiet only in comparison with the great activity of the early fall, and a resumption of activity on fully as large a scale as before is expected during the first quarter. Large inquiries are already coming up for most finished materials in view of the anticipated requirements of next year. State and municipal work is to figure largely in the year's business, as $4,000,000 of the city's bonds has been marketed for carrying out the various building, sewer and water projects, and the harbor improvements now under way are to be continued through the coming year. The filling of orders keeps stocks in the hands of local merchants comparatively low, and a scarcity is still felt in some lines, while deliveries appear to be farther off than ever. The delay in delivery from the East, combined with several other considerations, is throwing a larger volume of business to the importers. Jobbing prices here are fully maintained, with an advance in some departments over previous quotations. All raw materials are dull, spot pig iron being inclined to weakness.

Rails.—Recent bookings of standard sections for the smaller roads in this territory are of moderate proportions, though occasional orders are being placed, and considerable business has been taken for delivery extending into the second half of 1910. Light rails are quiet, but liberal orders for stock are expected in the first quarter. Several new inquiries for standard rails are coming out, and an increasing tonnage is looked for in the near future. The State Harbor Commission has ordered 220 tons of 9-in. girder rails and switches from the Pennsylvania Steel Company. Contracts have been let for a 26-mile extension of the Northwestern Pacific at Eureka, Cal. A contract has been let by the Bandon-Port Orford Railroad for 60-lb. rails, April delivery, and some rolling stock. It is announced that construction

work on the Central Oregon & Pacific line will be started next spring. Local borax interests are planning a 30-mile narrow gauge road in San Bernardino County, California.

Bars.—Prospective bar business is considerably increased by the number of reinforced concrete buildings on which contracts are about to be let. In addition to the usual jobbing business, some very large inquiries are coming into the market, though few orders of much magnitude are being placed at the moment. New business, in fact, is rather quiet, as neither merchants nor consumers care to order heavily until after the annual stock taking is completed. Stocks on hand are being replenished to some extent, though most of the arrivals are required for former orders, and there is still a shortage of some sections. Some foreign material is arriving, but not enough to relieve the situation materially. Local merchants have again advanced their prices on both steel and iron bars. The advance within the last three months amounts to about 30c. per 100 lb., and the former price cutting has given place to a decidedly bullish attitude. The present quotations from store are: Steel, 2.50c.; iron, 2.30c. It is reported that prices in Los Angeles at the moment are 10c. per 100 lb. lower.

Structural Material.—The record of building contracts let in San Francisco in November shows little increase, but the number of fabricating orders has been growing, and new projects are coming up, both here and in other coast cities, as rapidly as could be expected. Much of the work now being let locally is of small importance, but is keeping the shops well occupied. The Pacific Rolling Mill Company has a small contract for the St. Francis Hotel annex. The bid of Dyer Bros. on the county jail, supposed to be the lowest, was not opened on account of the delay of that firm in erecting the Hall of Justice, and the contract will probably go to the Pacific Rolling Mill Company at $70,660. The Denman school contract was placed with the Noelke-Richards Iron Company, Indianapolis. Several other school contracts are to be let shortly. Bids are now being taken on the Olympic Club building. The Southern Pacific is preparing to erect a new station at Sixteenth street, Oakland, at a cost of $250,000. Plans are being completed for the new McNutt Hospital, to be a five-story steel building. A project has been started for a $500,000 infirmary for Alameda County. The Llewellyn Iron Works has taken a large contract for the Los Angeles Trust & Savings Bank. Several steel bridges destroyed by the recent flood in Washington will probably be replaced the coming year. The city of Spokane, Wash., has sold $500,000 bonds for new bridge work. Bids are being taken on a small bridge in Merced County, California. It is announced that a $500,000 theatre building will be started next spring in Portland, Ore. Fabricators still report some shortage of plain material, and in view of increasing delay in shipments orders are being placed with foreign mills. The California Metal Trades Association has announced that in view of the failure to secure a differential from the railroads in favor of the plain material, local fabricators will hereafter buy foreign material almost exclusively, and that both Los Angeles and Northern fabricators have joined in the movement. While the past efforts of individual importers to carry stocks of foreign material have been unprofitable, it is believed that as long as they work in harmony the fabricators will be able to keep an adequate supply on hand. Some orders have already been placed, the amount for the entire coast being estimated at about 20,000 tons, but the material is not likely to arrive before the beginning of summer. Beams and channels, 3 to 15 in., from store in San Francisco, are quoted at 2.70c.

Pig Iron.—Foundry activity is again increasing to some extent, and the output of cast iron work will be materially larger than for the first half of the year. Preliminary arrangements are now being completed on a number of large orders, and melting will be on a larger scale for the next few months. The pig iron market, however, is still in a somewhat irregular condition, with very little immediate demand, as some foundries have a considerable tonnage purchased many months ago, and others placed liberal orders at the beginning of the upward movement last summer. Buyers are now holding off for special inducements, and while the larger importers are generally maintaining their former quotations, there is pressure to sell in some quarters. Some recent offers are reported as follows: For future delivery, English, $21.50; Scotch, $24.50; spot, Continental No. 1, $21; No. 3, $19. The nominal quotation of $25 on No. 2 Southern foundry iron is still held, but this iron is not moving here at present. The ruling figures on large lots are still held at $25 for Chinese iron, $23 to $24.50 for English and Continental.

Cast Iron Pipe.—No new tonnage of any consequence has been booked for coast delivery, the only business consisting of a few small orders. Some small municipal projects are being figured, but are not likely to be let until after the first of the year. Deliveries on the local fire protection system are nearly completed, and most of the material has been tested, but laying has not commenced. There is considerable interest in plans for the acquisition of a municipal water supply. A definite offer of the Spring Valley Company to sell has been followed by a call for an election to decide the matter, as well as to provide for the prosecution of the Lake Eleanor project. The town of Hood River, Ore., has issued $90,000 bonds for a water system. The city of Spokane, Wash., has sold $500,000 bonds for extension of its water system.

Merchant Pipe.—The movement from mill to merchant has fallen off materially, and will probably not be resumed for about three months, as local interests have placed orders covering their winter requirements. With a heavy early rainfall no large demand is expected from the usual sources, either here or in the oil fields, until the end of winter. The jobbing movement is fair for this time of year, but considerably below the early fall records. The outlook for the oil business is excellent. The daily production has made little increase of late, while the consumption has exceeded all former records, leaving little surplus. An encouraging factor is the development being carried out by the transcontinental railroads in the California fields. Jobbing prices on pipe are firmly held, in sympathy with the Eastern market.

Old Material.—All descriptions of old material have been very quiet for the last month, and no improvement is expected before the first of the year. Offerings are not unduly large in any line, but with local buyers holding off there is occasional pressure to sell cast scrap, and some sales are quoted at lower prices. The larger offerings, however, are held for an advance. Other descriptions are higher, in sympathy with the firmness in Eastern markets. No cast scrap is moving above $17, but large holders expect to realize about $20 per gross ton within a few months. Other quotations are as follows: Steel melting scrap, $11 per gross ton; railroad wrought scrap, $12.50 to $13.50 per net ton; rerolling rails, $11.50 to $12 per net ton, with some sales reported at $13; relaying rails, $30 to $31.50. Relaying rails are in good demand.

The Pacific Coast Steel Company, an outgrowth of the Doak Sheet Metal Company, will have its plant at South San Francisco in full operation about the first of the year. The last of the machinery is now being installed.

Henry Disston & Sons, Inc., have opened branch houses in Seattle, Wash., Portland, Ore., and Vancouver, B. C., under the management of D. W. Jenkins.

The Spokane Ornamental Iron Works, Spokane, Wash., is preparing to erect a new factory.

An addition is being made to the Griffin Wheel Company's car wheel foundry in Tacoma, Wash.

Buffalo.

BUFFALO, N. Y., December 14, 1909.

Pig Iron.—Sales for the week have been light; aggregating about 5000 tons, principally in carload lots, although one order of 2000 tons was received for low silicon iron and foundry grades. Shipments from furnaces on contracts continue to be exceedingly heavy. Prices are practically unchanged from the quotations of last week; the prospective early increase in the cost of coke and ore keeping them firmly maintained. The following schedule fairly represents the market for the remainder of year and first quarter per gross ton, f.o.b. Buffalo:

No. 1 X foundry	$17.25 to $18.00
No. 2 X foundry	17.00 to 17.50
No. 2 plain	16.75 to 17.25
No. 3 foundry	16.50 to 16.75
Gray forge	16.25 to 16.50
Malleable	17.50 to 18.00
Bessemer	19.25 to 19.75
Basic	18.25 to 18.75
Charcoal	20.50 to 21.00

Finished Iron and Steel.—The leading interest states that new business in bars, plates and other finished products continues to hold up well, but some of the other sellers report quieter conditions. New business is not much sought after, the crowded condition of the mills preventing the promise of any but for forward deliveries. Forging shops are experiencing difficulty in obtaining forging blooms and billets, especially in the large sizes, as the mills are themselves rolling the entire product for their own use and have no surplus for the general market. In fabricated work the demand is large for the season, and a number of building projects requiring structural steel will soon be in shape for taking figures. Bids will be received next week for the steel for the Standard Mirror Company's new factory plant, about 150 tons, and for steel and concrete reinforcing bars for the Beaver Mfg. Company's new plant, aggregating a like tonnage. Tenders were submitted this week for 125 tons of structural steel for a bridge over the Erie Canal at Georgia street, Buffalo, to be built by the State of New York.

Old Material.—There has been no improvement in the scrap iron market the past week, business continuing inactive and dormant in sympathy with the quiet conditions in eastern Pennsylvania. The continued limiting of shipments on contracts to some of the Buffalo mills also has a weakening tendency. Owing to the curtailed inquiry prices are

largely nominal, with a slightly lower drift. We quote dealers' prices as follows, per gross ton, f.o.b. Buffalo:

Heavy melting steel	$16.50 to $17.00
Low phosphorus steel	20.00 to 21.00
No. 1 railroad wrought	18.00 to 18.50
No. 1 railroad and machinery cast scrap	16.50 to 17.00
Old steel axles	20.50 to 21.00
Old iron axles	26.00 to 26.50
Old car wheels	17.50 to 18.00
Railroad malleable	17.00 to 17.50
Boiler plate	14.50 to 15.00
Locomotive grate bars	13.00 to 13.50
Pipe	14.00 to 14.50
Wrought iron and soft steel turnings	11.00 to 11.50
Clean cast iron borings	9.00 to 9.50
No. 1 busheling scrap	14.00 to 14.50

Cleveland.

CLEVELAND, OHIO, December 14, 1909.

Iron Ore.—There is a feeling among furnacemen that if they are to secure their requirements of the better grades of ores for the coming season they must not delay making reservations. During the week there have been several reservations of round lots of non-Bessemer ore and a number of inquiries are pending. The demand for non-Bessemer ore has become so active that some of the merchant ore firms are notifying those of their regular customers from whom they have not yet heard it would be a good plan to make their reservations before all the particularly desirable grades are taken. Although the bulk of the tonnage of the Bessemer ore was spoken for a few weeks ago, there is still some inquiry, particularly for old range ore. The demand for old range Bessemer is heavier than usual, and as the supply is quite limited a shortage is predicted. No prices on next season's ore are being quoted as yet, and will not be until they are formally fixed by the ore firms. Action making the expected advance may be taken late this week or may be deferred until soon after the first of the year. This season's prices at Lake Erie docks, per gross ton, are as follows: Old range Bessemer, $4.50; Mesaba Bessemer, $4.25; old range non-Bessemer, $3.70; Mesaba non-Bessemer, $3.50.

Pig Iron.—The market continues quiet. No sales of any grade of iron in lots of any size are reported, and no inquiries of importance have come out. The only sales noted are small lots of iron for spot shipment, mostly special grades. Although weak spots have developed, furnaces as a rule are inclined to maintain prices, sellers holding that concessions at the present time would not arouse much market activity. No. 2 Northern foundry can be bought at $17, Valley furnace, for spot shipment and first quarter delivery, but most of the furnaces are holding to from $17.25 to $17.50. No inquiries have come out the past month large enough to test the market thoroughly. Sellers expect the dullness to continue till after the first of the year. The consumption continues heavy, consumers as a rule taking all the iron on their contracts as fast as furnaces are ready to ship it. The new stack of Corrigan, McKinney & Co. in Cleveland is nearing completion, and it is expected that it will be blown in about January 15. This will make four merchant furnaces for Cleveland as compared with two a year ago, before the second stack of the Cleveland Furnace Company was placed in operation. For December delivery we quote, delivered, Cleveland, as follows:

Bessemer	$19.90
Northern foundry, No. 1	$18.65 to 18.75
Northern foundry, No. 2	18.15 to 18.25
Northern foundry, No. 3	17.65 to 17.75
Southern foundry, No. 2	18.85
Gray forge	17.40 to 17.65
Jackson County silvery, 8 per cent. silicon	20.55

Coke.—A local furnace interest is in the market for its requirements during the first half, aggregating about 30,000 tons a month. Prices are not as firm as they were in furnace grades. There is very little demand for foundry coke. We quote standard Connellsville furnace coke at $2.75 to $2.85 per net ton, at oven, for first half delivery, and $2.70 to $2.75 for spot shipment. Connellsville 72-hour foundry coke is held at $3.25, at oven, for spot shipment and $3.25 to $3.40 for the first half.

Finished Iron and Steel.—Some mill agencies report an increase in the volume of specifications, due to the receipt of orders on contracts that expire the first of the year, consumers having been notified that all unfilled contracts will be canceled on date of expiration. With other agencies contracts had previously been specified against in most cases to the full amount of the tonnage, and these agencies report a decided falling off in specifications. In fact, some buyers having contracts for the first quarter on steel bars have specified for all the tonnage on those contracts. In many cases deliveries on these first quarter specifications cannot be secured until well along in the second quarter. Some of the implement makers who thought they had enough steel bar tonnage under contract to last them until July 1 are planning a considerable larger output than they expected a few months ago, and are in the market for additional steel bar requirements, but they are having trouble in finding mills that are in a position to take their orders and promise deliveries as soon as desired. The demand for steel bars for early delivery continues heavy and buyers are compelled to place orders with jobbers, paying 1.90c. at local warehouses for good sized lots, rather than to wait for mill deliveries. Owing to the heavy demand warehouses are unable to keep up their stocks. For future delivery we quote steel bars at 1.45c. to 1.50c., Pittsburgh. The demand for plates and structural material in small lots for early delivery continues good, and Eastern mills able to make early shipment are getting many carload orders at 1.60c., at mill, or 1.79c., Cleveland. Another mill that is now in a position to sell plates for quick shipment is quoting 1.60c., Pittsburgh, for carload lots, and 1.70c. for less. The demand for black and galvanized sheets continues active, and few mills are able to make deliveries within eight weeks. Mills that can make quick shipment are getting premium prices. Blue annealed sheets are also commanding premium prices for early delivery. The demand for iron bars is gradually improving and mills are getting good specifications on contract. We quote iron bars at 1.60c. to 1.65c., Cleveland. The demand for shafting has improved considerably and mills are not promising shipment within four to eight weeks. There is a good demand for forging billets, both for prompt shipment and for contracts, sales being made in this market at $32 to $32.50, Eastern mill, or $35.50 to $36, Cleveland, for early or future delivery. The only structural work of importance that has developed during the week is the Second National Bank Building in Akron, Ohio, that will require 1500 tons.

Old Material.—The market is dull and weak. Quotations on several grades show a decline of 25c. a ton. The largest local consumer of steel making scrap is entirely out of the market, and there is practically no inquiry for this grade. There is some demand for small lots of iron making scrap, but one of the large local consumers is now holding back on shipments. There is a limited demand for cast scrap in small lots. Dealers do not look for an improvement in the demand until after the first of the year. Prices, per gross ton, f.o.b. Cleveland, are as follows:

Old steel rails	$16.25 to $16.75
Old iron rails	20.00 to 20.50
Steel car axles	20.50 to 21.00
Old car wheels	17.00 to 17.50
Heavy melting steel	16.00 to 16.50
Relaying rails, 50 lb. and over	22.50 to 23.50
Agricultural malleable	14.50 to 15.00
Railroad malleable	17.00 to 17.50
Light bundled sheet scrap	11.00 to 11.50

The following prices are per net ton, f.o.b. Cleveland:

Iron car axles	$21.00 to $21.50
Cast borings	9.00 to 9.25
Iron and steel turnings and drillings	10.75 to 11.00
Steel axle turnings	12.00 to 12.50
No. 1 busheling	14.00 to 14.50
No. 1 railroad wrought	16.75 to 17.25
No. 1 cast	14.50 to 15.00
Stove plate	12.00 to 12.50
Bundled tin scrap	11.00 to 11.50

A deserving institution has been brought to the attention of Northern business interests by J. P. Rawley, 57 Broadway, New York City, who is in receipt of a letter from William A. Blair, vice-president of the Peoples National Bank, Winston-Salem, N. C., appealing in behalf of the Slater Industrial and State Normal School, located in that city. This is a school for colored people which is claimed to be the most important one in the entire South save Tuskeegee and Hampton. Mr. Blair is very desirous of receiving contributions for the benefit of this school by reason of the fact that the State officials, seeing its salutary effect upon the colored people, have offered a donation of $12,000 provided the trustees raise the same amount. As the contribution is needed for additional school buildings, it is stated that the colored people will do the manual labor free and that every dollar given by the public thus means $4 to the school. It is suggested that contributions of one or two dollars be sent to William A. Blair, Winston-Salem, N. C.

The Elwood Ivins Tube Works, whose mills are at Oak Lane Station, Philadelphia, is running overtime to catch up on its orders, being five months behind on orders in seamless steel, brass and copper tubes. This company now makes tubes as large as 4 in. in diameter in both tool steel and open hearth steel. It has recently been awarded a large contract by the United States Government, and has also received a large order from Japan. It is adding more furnaces and machinery as rapidly as possible. The product of the company is known as extremely accurate and high finished tubes. They are running 42 draw benches, and two sets of 18-in. rolls, with five furnaces.

New York.

NEW YORK, December 15, 1909.

Pig Iron.—On one purchase of foundry iron amounting to about 3000 tons for pipe and valve work, deliveries to be made in the second quarter of 1910, concessions are reported from prices recently made by most eastern Pennsylvania furnaces. A new England foundry bought 1200 tons, of which half was Virginia iron of low manganese content. Some inquiries are up for the second quarter of next year, and for the most part furnaces are asking the prices heretofore ruling for such deliveries. Pipe works buying in the East of late has been light, including some small lots of foreign iron, but inquiry has now come up from the leading pipe interest for works in other districts. The position of furnace interests is well maintained, and the present quietness is regarded as natural in view of the season and the generally well bought condition of the foundry trade. We quote the New York market as follows: Northern No. 1 foundry, $19 to $19.50; No. 2 X foundry, $18.50 to $19; No. 2 plain, $18.25 to $18.50.

Steel Rails.—Two inquiries from trolley lines in New York State have come up—one for 2000 tons and the other for 800 tons. The slowness of Eastern business in developing promises to make some rolling mill capacity available for other products.

Ferroalloys.—The price of ferromanganese remains unchanged at $45.50, but the demand has improved, and no concessions are being made. There have been some good sales of ferrosilicon, including one 200-ton lot. For 50 per cent. ferrosilicon sellers here are asking from $62 to $62.50.

Structural Material.—Business has continued at about the same high level with which the month opened and bids fair to do so throughout the year with very bright prospects for the next quarter. Aside from the very natural explanation that the fabricators are endeavoring to get in the full specifications on their contracts for 1909, because the latter were taken at prices below those now prevailing, there is the even more important one that they are out of stocks. The mills are equally anxious to finish up their specifications to take new business at the current level with the beginning of the year. They have no need of and are seeking no new business for the remainder of this quarter. No especially large contracts have come to the fabricators in the East during the week, the one exception being about 900 tons for the Interborough Rapid Transit Company for a station at 240th street. The most important contract from any section was the Mandel Building, Chicago, 10,000 tons, placed last Friday with the American Bridge Company. The Virginia Bridge & Iron Company was awarded a contract for 500 tons of fabricated material (Bethelehem shapes) for a mercantile building in Charleston, S. C. Prices remain unchanged at 1.76c., tidewater, for plain material, mill shipments, and 2c. to 2¼c. for material out of stock.

Plates.—In plates business has been very good throughout this quarter and there is every reason to expect the next to equal it. No especially large tonnage contracts in plates came up last week and there are none in sight. So far the one attempt to advance plate prices for the next quarter has met with little success, and for the present the quotation on regular deliveries continues to be 1.76c., New York.

Old Material.—Heavy cast and stove plate are in good demand and firm. Wrought pipe, cast borings and wrought turnings are dull and inclined to weakness. The general demand from rolling mills and steel works almost invariably falls off in December, as most of them will probably close for the holidays and for inventory. In face of this, offerings of old material have been fairly taken care of. It is expected that by January 15 the demand will be a great deal better, as consumers are well supplied with contracts for their product, and will be pushed to full capacity for months. Dealers are becoming more and more worked up with regard to the policy of the eastern Pennsylvania steel mills in buying steel scrap through a single agency. A meeting was held in Philadelphia on Tuesday for the purpose of bringing about some action to maintain their footing in the trade. Current quotations are as follows, per gross ton, New York and vicinity:

Rerolling rails	$15.50 to $16.00
Old girder and T rails for melting	14.50 to 15.00
Heavy melting steel scrap	14.50 to 15.00
Relaying rails	20.50 to 21.00
Standard hammered iron car axles	23.50 to 24.00
Old steel car axles	20.50 to 21.00
No. 1 railroad wrought	16.50 to 17.00
Wrought iron track scrap	15.50 to 16.00
No. 1 yard wrought, long	15.50 to 16.00
No. 1 yard wrought, short	15.00 to 15.50
Light iron	9.50 to 10.00
Cast borings	9.50 to 10.00
Wrought turnings	11.00 to 11.50
Wrought pipe	13.75 to 14.25
Old car wheels	16.00 to 16.50
No. 1 heavy cast, broken up	15.50 to 16.00
Stove plate	13.00 to 13.50
Locomotive grate bars	12.50 to 13.00
Malleable cast	17.00 to 17.50

Bars.—A very good business is still being done in both steel and iron bars. The condition in these lines may be said to have remained the same since the first of the month with no immediate prospect of a falling off. The price of steel bars remains firm at 1.66c., tidewater, and as yet no advance has been made on bar iron, which is still quoted at 1.70c. to 1.75c. for ordinary refined iron and 1.75c. to 1.80c. for test bars in carload lots delivered at New York.

Cast Iron Pipe.—The city of New York has bought 8000 tons of water pipe through contractors. Current business is light, but good inquiries are still being received for next year's delivery. Carload lots of 6 in. are quoted at $25.50 to $26, per net ton, tidewater.

Metal Market.

NEW YORK, December 15, 1909.

THE WEEK'S PRICES

Cents per Pound.

	Copper.			Lead.		Spelter.	
Dec.	Lake.	Electrolytic.	Tin.	New York.	St. Louis.	New York.	St. Louis.
9	13.75	13.37½	32.45	4.40	4.30	6.37½	6.20
10	13.62½	13.37½	32.45	4.50	4.42½	6.40	6.25
11	13.75	13.50	32.50 32.70	4.50	4.42½	6.40	6.25
13	13.75	13.50	32.85	4.50	4.42½	6.40	6.25
14	13.75	13.50	32.80	4.50	4.42½	6.40	6.25
15	13.75	13.50	32.80	4.60	4.52½	6.40	6.25

Copper.—The latest report of the Copper Producers' Association, which is given elsewhere, had little effect, as it showed no material change from conditions of a month ago, and the market is a waiting one. Prices are nominal, and it is the general feeling that little will be done in the way of buying until after the trade is satisfied on the question of whether there will be a curtailment in production. It is the general feeling that the larger producers intend to restrict their output in the next few months, and people of good authority in the trade state that they have practical assurance to this effect. Some buyers who were not very close to the market situation made purchases on December 11 and 13 following the copper producers' report, because some curtailment was shown in the November production as against the October figures. It was pointed out by those who have made a more careful study of the situation that November was a short month as far as working days were concerned, so the difference was not material. The United Metals Selling Company is asking higher prices than the trade in general which practically puts that company out of the market. We quote electrolytic at 13.50c. and lake at 13.75c. Some outside lots of lake copper may be had at 13.62½c. Casting copper is quoted at 13.37½c. Lake copper is much stronger than electrolytic. The exports so far this month have been lighter than expectations based on the heavy sales that were made early in the month. So far this month 10,496 tons of copper have been sent abroad, and as the month is half over the December exports promise to be light. L. Vogelstein & Co. give the following figures of German consumption of foreign copper from January to October, 1909: Imports of copper, 130,556 tons; exports of copper, 6699 tons; consumption of copper, 123,857 tons, as compared with consumption during the same period in 1908 of 128,006 tons. Of the above quantity, 119,329 tons were imported from the United States. In London to-day spot copper was sold for £59 10s., and futures for £60 10s. The sales amounted to 700 tons of spot and 800 tons of futures.

Pig Tin.—Pig tin is steadily advancing and an optimistic feeling prevails. The spot tin situation is close. It is evident that the tin now held is controlled by a few people and the situation is verging on a corner. This is not a manipulative corner, but a natural one. Those who hold the tin are sellers who deal largely with consumers. On December 11 there was a strong buying movement, and this was the first time in many weeks that there was a buying movement on a Saturday. The market began to take an upward trend on the afternoon of the 8th, when 300 tons were sold. The following day the market went up 20 points and it was kept there until the 11th, which was the biggest day of the week. On that day between 300 to 400 tons of tin was sold, and prices ranged from 32.50c. to 32.70c. Between those figures all sorts of prices were taken, and it was evident that the buying was being done in anticipation of an early advance on Monday. The London market responded and advanced sharply on Monday morning, but the trading there was not on such a solid basis as in this market. Yesterday the price went up to 32.80c. This morning it was reported to be off a little, but there was no buying and the price was nominal. This afternoon pig tin sold for 32.80c. In London spot tin was sold to-day for £148 10s. and futures for £149 15s. The sales were 320 tons of spot and 600 tons of futures.

Tin Plates.—There is a slight shortage of tin plates abroad, and a further raise in the price of Swansea plates is looked for. As was stated last week, considerable foreign tin plate has been sold in this country of late, and now buyers of such tin plate report that deliveries are not being made promptly. There has been a slight let up in the demand for domestic tin plate, as jobbers who supply the retail trade are feeling the usual holiday lull and are asking

for less material. Deliveries are uncertain, however, and the mills have all they can do for three months ahead. The leading interest quotes 100 lb. IC coke plates at $3.84, but the independent mills are demanding premiums up to 20c. a box.

Lead.—The lead situation is puzzling to those who follow the market closely. As a rule the demand for lead is very light in December, and this month is no exception to the rule, but nevertheless the American Smelting & Refining Company made a sharp advance in its quotations late in the afternoon of December 8, when the price was put from 4.40c. to 4.50c. The advance was made too late to affect that day's business, but on December 9 the independents followed suit by putting their price to 4.52½c. The St. Louis price was advanced by both the American Smelting & Refining Company and the outside interests to 4.42½c. This afternoon a further advance of 10 points here and in St. Louis was announced by the American Smelting & Refining Company. The natural assumption regarding this upward movement is that the company booked more orders in the last six weeks than the trade in general had any idea of. In St. Louis many consumers were caught short and higher prices than 4.42c. were done there early in the week. This buying, however, was principally for special brands. The London market responded to the situation here, but the price there was raised to £13 1s. 3d., which is a raise equal to only five points here.

Spelter.—Spelter is not active, but the price is being well maintained. The market has weakened in spots, but this is accounted for by the fact that some holders of outside lots who bought cheaply some time ago have unloaded. We quote the New York market at 6.40c., and the St. Louis market at 6.25c. In St. Louis the market is easier than here.

Antimony.—It is evident that antimony will be much higher within a few weeks, as sellers are quoting the metal for shipment in January, February and March at advanced prices. They are asking 8.37½c. for Hallett's and 9c. for Cookson's for delivery during those months. Spot antimony is up somewhat, and Hallett's is now bringing 8.25c., while Cookson's is selling for 8.50c. Outside brands are bringing about 8c., but pick up lots may be had cheaper for the time being.

Old Metals.—The market is steady but dull. Following are dealers' selling prices:

	Cents.
Copper, heavy cut and crucible	13.00 to 13.25
Copper, heavy and wire	12.50 to 12.75
Copper, light and bottoms	11.75 to 12.00
Brass, heavy	9.25 to 9.50
Brass, light	7.75 to 8.00
Heavy machine composition	12.25 to 12.50
Clean brass turnings	8.75 to 9.00
Composition turnings	10.25 to 10.50
Lead, heavy	4.20 to 4.25
Lead, tea	3.90 to 3.95
Zinc scrap	5.00 to 5.25

Iron and Industrial Stocks.

NEW YORK, December 15, 1909.

Greatly improved conditions have ruled on the stock exchanges the greater part of the past week. Advances have been general, although fluctuations have seldom been wide. The temperate tone of the President's message has unquestionably had much to do in strengthening values of both railroad and industrial securities. The range of prices on active iron and industrial stocks from Thursday of last week to Tuesday of this week was as follows:

Allis-Chalm., com.	15⅛- 15⅞	Railway Spr., com.	50½- 52½
Allis-Chalm., pref.	51¼- 54½	Republic, com.	46¼- 47
Beth. Steel, com.	34 - 34¾	Republic, pref.	106 -107
Beth. Steel, pref.	67½- 68½	South. I. & S., com.	23 - 24¼
Can, com.	14¼- 14¾	South. I. & S., pref.	52
Can, pref.	84 - 84¾	Sloss, com.	87½- 89
Car & Fdry, com.	72 -*73	Pipe, com.	32 - 33⅜
Steel Foundries	65 - 66	Pipe, pref.	84 - 84¾
Colorado Fuel	50⅜- 53	U. S. Steel, com.	90⅜-*92½
General Electric	159⅞-161	U. S. Steel, pref.	124¾-126
Gr. N. ore cert.	80⅜- 82½	Westinghouse Elec.	83¾- 84
Int. Harv., com.	108¾-110¼	Va., I., C. & C.	72 - 72⅛
Int. Harv., pref.	124 -125¼	Am. Ship, com.	72½- 80
Int. Pump, com.	51 - 51⅞	Am. Ship, pref.	110
Int. Pump, pref.	90⅜	Chi. Pneu. Tool	37 - 37½
Locomotive, com.	61 - 61⅞	Cambria Steel	46½- 47½
Locomotive, pref.	113 -114	Lake Sup. Corp.	27½- 28½
Nat. En. & St., com.	26½- 30¼	Penn. Steel, pref.	115 -116
Nat. En. & St., pref.	98¼	Warwick	11
Pressed St., com.	52 - 52¾	Crucible St., com.	14¾- 15¾
Pressed St., pref.	105¼-105⅝	Crucible St., pref.	92 - 94⅞

* Ex dividend.

Last transactions up to 1.30 p.m. to-day are reported at the following prices: United States Steel common 91, preferred 125¼, bonds 105½; Car & Foundry common 72, preferred 119; Locomotive common 60¾, preferred 113⅞; Steel Foundries 64½; Colorado Fuel 52¼; Pressed Steel common 51½, preferred 105⅝; Railway Spring common 51⅞; Republic common 46, preferred 106½; Sloss-Sheffield common 87; Cast Iron Pipe common 32½, preferred 84½; Can common 14, preferred 84⅜.

Iron and Steel Bonds.

Chisholm & Chapman, 18 Wall street, New York, furnish the following quotations:

	Bid.	Asked.
Bethlehem Steel 1st ext. 5s, due January, 1926	115	118
Bethlehem Steel purchase money 6s, August, 1998	88¾	89¾
Buffalo Iron 5s, October, 1925	95	100
Buffalo & Susquehanna Iron 1st 5s, June, 1932	..	99½
Buffalo & Susquehanna Iron deb. 5s, January, 1926	94	97¾
Dominion Iron & Steel 5s, July, 1929	95¼	..
La Belle Iron 1st 6s, December, 1923	103¾	104½
Lackawanna Steel 1st 5s, April, 1923	99	99⅝
Maryland Steel 1st 5s, February, 1922	101½	..
Pennsylvania Steel 1st 5s, November, 1917	..	103
Pennsylvania & Maryland Steel 6s, September, 1925	108½	110
Republic Iron & Steel 1st 5s, October, 1934	102⅝	..
Sloss Iron & Steel 1st 6s, February, 1920	106	108½
Sloss Iron & Steel consol. 4½s, April, 1918	95½	..
Jones & Laughlin 1st 5s, May, 1939	101⅜	101⅞
United States Steel Corporation.		
Collateral Trust 5s, Series A, C, E, April, 1951	114¾	115¼
Collateral Trust 5s, Series B, D, F, April, 1951	114¾	115¼
Sinking Fund 5s, April, 1963	105⅛	105⅜
Union Steel 1st 5s, December, 1952	104¼	105¼
Clairton Steel 5s, 1908-1913	100	..
St. Clair Furnace 1st 5s, 1910-1939	100	..
St. Clair Steel 1st 5s, 1908-1926	100	..
Illinois Steel deb. 5s, January, 1910	100	..
Illinois Steel 5s, April, 1913	100	..

All bonds quoted "and interest."

Dividends.—The American Smelting & Refining Company has declared a dividend of 1¾ per cent. on the preferred stock. payable January 3.

The American Car & Foundry Company has declared a quarterly dividend of ½ per cent. on the common stock and 1¾ per cent. on the preferred stock, payable January 1.

The La Belle Iron Works has declared the regular quarterly dividend of 2 per cent., payable December 31.

The Railway Steel Spring Company has declared a quarterly dividend of 1¾ per cent. on the preferred stock.

The Crucible Steel Company has declared a quarterly dividend of 1¾ per cent., which is at the rate of 7 per cent. The dividend is payable December 23. This is the first time since 1903 that the full quarterly rate of 1¾ per cent. has been declared by this company.

The Jones & Laughlin Steel Company, Pittsburgh, which started the first of its new blast furnaces at Aliquippa, Pa., on December 1, expects that in about two months No. 2 stack will be ready and No. 3 about two months later. For the present the pig iron made in No. 1 stack will be shipped to the mills of the Jones & Laughlin Steel Company in Pittsburgh. W. H. Lewis is general superintendent of blast furnaces.

The W. R. Beatty Machinery & Equipment Company, Carson street, Pittsburgh, dealer in new and second-hand machinery, making a specialty of forging plant equipment, has recently been appointed local representative by the Castolin Company of America, St. Louis, Mo., American agents for a new process of brazing cast iron.

The Hanson & Van Winkle Company, Newark, N. J., announces that the United States Court of Appeals, in a recent decision, affirmed the judgment of the Circuit Court in favor of that company in the suit brought against it by the United States Electro-Galvanizing Company, claiming an infringement of a patent. The Circuit Court rendered its verdict June 8, 1908.

The Cleveland Machine Specialty Company, Cleveland, Ohio, has been formed to place on the market a new arbor press. Later it is planned to make a number of specialties. W. H. Welch is at the head of the enterprise. The company has an office at 202 St. Clair avenue, N. E. For the present, at least, a manufacturing plant will not be started.

The Graham Nut Company, Pittsburgh, Pa., is not directly interested in ore properties, as reported in the daily press. It happens that the Catherine Mining & Exploration Company, in which some members of the Graham Nut Company are interested, is having some work done on a promising ore property near Michigamme, Mich.

Frank J. Corbett has been engaged by Manning, Maxwell & Moore, 85 Liberty street, New York, as salesman of the brass goods manufactured by the Ashcroft Mfg. Company, Consolidated Safety Valve Company, Hayden & Derby Mfg. Company and the Hancock Inspirator Company, all subsidiary to Manning, Maxwell & Moore.

Early Handling of Iron Ore on the Great Lakes.*

BY RICHARD B. SHERIDAN.

In a commercial sense the lakes are scarcely 50 years old, and the growth of the traffic has been little short of marvelous. Iron ore, the commodity which has built up the trade more than any other, was first discovered in the Lake Superior country in 1844 by William Burt and his party of surveyors. This deposit was located some 14 miles from what is now Marquette, which in those days was really further away from civilization than the Klondike was when discevered in 1898. On account of its location and the almost insurmountable difficulties of handling and transportation it was nearly 20 years before the ore of this district could be commercially worked. The pioneers began by smelting the ore in charcoal furnaces located close to the mines and then attempted to market it in Pittsburgh, the center of the iron industry.

The transportation problem was an important factor which had to be taken into consideration from the start. Iron at that time sold in Pittsburgh at $70 per ton, and by the time the charcoal iron of these northern furnaces was landed in Pittsburgh it had cost its producers close to $200 per ton, making it impossible from a commercial standpoint. It was not until 1855 when the Federal Government completed its first system of locks at the falls of the Sault Ste. Marie River, at Sault Ste. Marie, Mich., that this overwhelming cost of transportation was reduced. In that year, on August 14, the first cargo of ore was carried down the lakes from the mining district. This memorable shipment was taken by the brig Columbia and amounted to 114 tons. The entire shipments for the year amounted to 1449 tons. From this time the trade grew rapidly, but it was not until 1873 that a season's shipment of ore amounted to more than 1,000,000 tons.

Docks.

In the development of this traffic, which was destined to become such a factor in our industrial history, the first step taken by its pioneers was the construction of a loading dock at Marquette. This dock was built in 1860, and it is an interesting fact to note that its form of construction has been the model on which all of the great ore docks of the Northwest have been built. The ore was brought down from the mines on sledges and stocked in Marquette during the winter and shipped south as rapidly as possible after navigation opened. To facilitate and cheapen the cost of loading a long line of pockets was built on a dock extending out into the lake and arranged so that boats could be brought alongside for loading. The material was brought over the pockets on railroad cars arranged so as to be dumped into the same. Each pocket was equipped with spouts and gates, and of such hight as to permit of a slope to the chute, so that the material would run out by gravity. Naturally the first dock was of very limited capacity, but the principle has been the one on which all of these loading docks have been constructed.

These structures have been built up to the present time of wood,† with spouts and gates made of steel plate, the gates being arranged to be opened and closed by hand power. The principle is simple and very expeditious. Records are given in which boats of over 10,000 tons capacity have been loaded in as short a time as 1 hour.

The construction of the docks has in one way influenced the construction of the lake vessels. The spouts with which each dock was equipped were located 12 ft. apart along the dock side, and on account of this dimension the boats built in the early days had their hatches located 24 ft. centers, so that every other spout would be in a position for discharging into ships' holds without necessitating the shifting of the boat itself. As the boats became larger and the automatic grab buckets came into use, the number of the hatches was increased so as to require less hand trimming of the material in the hold of the boat; and to-day we find the ships equipped with hatches spaced 12 ft. centers, this distance being determined by the position of the spouts on the loading docks.

The question of loading, important as it has been, has not, however, been the perplexing factor in the development of the lake traffic. The great and all important difficulty that had to be met and overcome was the question of dispatch in the unloading of boats in the lower lake ports. The rivers were narrow, and generally navigable only to a limited distance inland, and, furthermore, the season of navigation was very short. These factors combined made the question of taking care of the tonnage, which grew rapidly, a most serious one to solve, and one which is being improved upon each year.

Forty years ago the boats were not constructed so as to easily take ore cargoes in their holds, and most of the bulk material, such as coal and ore, was carried in deck loads. Where it was carried in the hold it was hoisted to the deck by horsepower and dumped into barrows and wheeled ashore. In 1867 the horsepower was done away with, and a small hoisting engine used in its stead. At that time this was considered an important innovation, as the traffic was assuming large proportions and dock managers recognized the difficulties before them of coping with the vessels and tonnage.

Even after the introduction of power for hoisting the material from the ships' holds to the deck, little advance was made in bettering the dispatch of unloading, as it was impossible to take care of the tonnage on the docks. The material was wheeled from the boat to the shore and deposited in piles which the railroads would handle as rapidly as possible. These piles became larger each year and the storage was becoming a most expensive process and required a very large force of men. Little progress was made in any way toward improving these early methods, and it was not until the latter part of the seventies that any mechanical schemes were attempted. In 1879 a machine was constructed in the harbor of Cleveland, but it had so many faults that it could hardly have been called a success, and it was not until 1880 that the first successful unloading machine was developed. That year marks the beginning of the real and speedy development of material handling machinery, as well as the improvements in the ship construction of the Great Lakes.

The Early Boats.

At the time of the discovery of the ore deposits in the Lake Superior districts, and before the construction of the Sault Ste. Marie Canal, the entire Lake Superior trade was handled by but a handful of boats. This small fleet consisted of the following: Schooner Ocean, 15 tons; schooner Chippewa, 20 tons; schooner Merchant, 75 tons; schooner Napoleon, 150 tons, and one steamer, the Independence, which had a carrying capacity of 365 tons.

Naturally there were many other small craft on the other Great Lakes. None of these had been built for the carrying of ore, but had been constructed for passenger and packet freight, and were in no sense adapted for the handling of bulk cargoes. When they were pressed into service the ore had to be carried in deck loads. After the construction of the canal in 1855, ships were built for the express purpose of the ore trade, and among these it is interesting to note that the three largest at the time were the steamers Northerner, General Taylor and Mineral Rock, all of which carried from 300 to 400 tons. After the ore traffic became established most of the ore was carried in schooners, which were towed through the rivers, but as the seasons were short and the traffic increased time was saved by towing the schooners in fours and fives from the upper lakes to the unloading ports. This system of towage was carried on for some years, using lake tugs for the purpose. In 1870, however, the tug was dispensed with and the system of barge and consort was introduced. The barge was steam driven and usually carried about the same tonnage as its consort. It was always equipped with

* From a paper on "Material Handling Equipments for Lake Vessels," read at the meeting of the Society of Naval Architects and Marine Engineers, New York, November 18 and 19, 1909.

† The writer overlooks the steel dock at Two Harbors, Minn., built in 1907-8, the plans for which were illustrated and described in *The Iron Age* of October 3, 1907, p. 908.—EDITOR.

some sail so as not to be entirely dependent upon its barge. By operating the boats in pairs much time was saved at both ends of the trip.

In 1869 and 1870 two boats were constructed especially for ore traffic. These were the steamers R. J. Hackett and the Forest City. They were built to carry ore from the Jackson mine, and were constructed by Messrs. Peck & Masters, at Cleveland, Ohio. The boats were the first steamers to have continuous holds and hatches spaced 24 ft. centers. The R. J. Hackett was a craft 211 ft. long and 33 ft. beam, while the Forest City was 213 ft. long with a 33 ft. beam. Each boat had a carrying capacity of 1200 to 1300 tons. For 12 years after 1870, little or no change was made in the construction of the new boats, but in 1882 the Globe Iron Company of Cleveland built the Onoka, which was the first iron boat built for the ore trade. This boat had a length of 287 ft. and a beam of 38 ft.

First Unloading Machines.

Many of the various dock managers had been trying every means possible to deposit the ore back from the dock's face by mechanical means. This was first accomplished by a cableway machine, built and erected at Cleveland, Ohio, in 1880, under Alex. E. Brown's supervision, and with its introduction came the formation of the Brown Hoisting Machinery Company, which has since held such a prominent position among manufacturers. Each of the units going to make up an unloading plant consisted of a single rope cable tramway supported by two piers—one on the dock and the other about 300 ft. back from the dock face. The support farthest from the water was A-shape construction and guyed to anchors fixed in the ground. The front support was of special design and mounted on wheels running on two lines of track spaced 24 ft. centers. The front support was arranged on wheels so that it could be moved a limited distance each side of its normal position, the advantage being to reach every part of the ship's hatch, and also obviate unnecessary moving of the boat itself. This front pier was arranged to be moved by hand power, and was designed with a portal opening, so as to allow railroad cars to pass beneath to permit of loading material directly into cars or on to stock pile. This front support was equipped with an arm or apron, which could be housed in a vertical position or lowered down over the boat. The cable was attached to the end of this apron, and when the latter was brought to the vertical position the cable was bent at the hinge and carried on a circular guide, which was concentric with the axis of the hinge of the apron arm. The advantage of this arrangement was that the machine could be operated with the apron in a vertical or horizontal position. On the main cable was designed to run a trolley arranged to carry a 1-ton ore bucket. The various motions of trolley travel and the raising and lowering of the bucket were controlled through a single drum steam engine, which was located near the rear support.

In an engine house were located the engines controlling the trolleys on the various cableways making up the plant, and the operator for each machine was placed in a small house over the machinery house and at such a hight that he could easily see and control the trolley on the machine he was operating. The two supports of the cable were of such hight as to give a grade in the supporting cable toward the dock face, so that the traveling motion of the trolley when returning empty after discharging a bucket was accomplished by gravity and assisted by a counterweight arrangement acting on the trolley in a direction toward the dock face. By the use of the counterweight the engine employed was simply a single drum engine on which was wound a single line. The hoist line of each machine went from the drum on the engine over suitable sheaves to the trolley supporting the bucket, through the trolley, passing down around the hoist block and thence back to the trolley frame, where it was securely fastened.

The buckets were filled by hand in the hold of the boat and then lifted out by the machine and dumped into the storage pile or unloaded directly into cars. The cable was fitted with an up grade and down grade stop, the up grade stop being of such design as to trip the bucket and thereby dump the load. The down grade stop was simply in the nature of an automatic locking device arranged to hold the trolley still while the bucket descended into the boat, and when hoisting to maintain the trolley in the proper position until the bucket was hoisted into the trolley, when automatically the down grade stop would release, thus allowing the trolley and load to be pulled by the hoisting line up the cable to the dumping stop.

The above briefly outlines the construction and design of the first practical machines built for this traffic. In starting them, as might be expected, great opposition was encountered from the dock laborers, who only saw by an innovation a menace to their daily employment, and consequently every effort was made to prevent their successful operation. However, in the face of all the labor opposition the machine succeeded, and in the following year two or more plants were built and operated. This type of machine was an infinite improvement over the old methods, but it had one fault, and that was that it could only cover a limited storage pile. In the next machines, instead of using the cable type, a structural span bridge 180 ft. long was employed, and both its supporting piers were mounted on wheels, so that the machine could be moved along the full length of the dock.

[The bulk of the paper which follows is devoted to the evolution of unloading machinery, including descriptions of the Brown, Hulett and Hoover & Mason unloaders with which our readers are familiar, as well as the car dumpers used in loading coal into vessels.—*Editor.*]

The Musical Industry Merchant Marine League was organized at a meeting held in New York City on the evening of October 22. The object of this society is indicated in the title. Its membership is composed of manufacturers and dealers in musical instruments. The president is J. A. Coffin, Aeolian Company; vice-president, L. M. Ide, Laffargue Company; treasurer, B. H. Janssen, Park avenue and 128th street; secretary, George W. Gittins, Kohler & Campbell, Eleventh avenue and Fiftieth street. The society has issued circulars in which an appeal is made for co-operation in the work and reasons are set forth for the energetic development of a movement toward building up the American merchant marine. The statement is made that shipping facilities are especially desired to the countries of South America, whereby discrimination may be secured "in favor of our commerce instead of discriminatory service adverse in its workings to our national progressiveness as at present."

The Buxton, Doane Company, the E. Buxton & Son Company and the George B. Doane & Son Company, iron and steel scrap dealers, Boston, Mass., announce that the Boston branch of the E. Buxton & Son Company, with offices at 200 Summer street, and the George B. Doane & Son Company, with offices at South Boston, have been consolidated, with headquarters at 18 Midway street, Boston, where George B. Doane, Alfred H. Knight and William S. Buxton will be located. The offices formerly occupied by the Boston branch of the E. Buxton & Son Company will be discontinued, and Walter A. Buxton will continue his duties with the E. Buxton & Son Company, whose headquarters and main offices are in Worcester, Mass. The new company thus formed will continue the business formerly covered by the Boston branch of the E. Buxton & Son Company and by the George B. Doane & Son Company.

The December *Pipe Parley* of the McWane Pipe Works, Lynchburg, Va., presents as its feature of interest a view of a railroad train of 26 cars loaded with pipe for shipment on a government order from the company's Radford works, Virginia, to the Island of Guam, via Mare Island, Cal.

The Machinery Trade.

NEW YORK, December 15, 1909.

While there are no large lists before the trade at present it is evident that December will be an excellent month. A number of machinery houses in this territory are doing a much better business than inquiries received would warrant, and most of this business is in the way of orders picked up here and there. The American Locomotive Company has been the heaviest buyer of late and it is probable that the orders that have been placed during the last two weeks constitute the largest amount of business given out in this vicinity during the year without a preliminary list being issued to the trade. Inquiries have fallen off to some extent, but this is no more than was expected in view of the approaching holidays, and while some people are delaying the placing of orders until after the first of the year, there are many others who desire to close out pending business in order to get their expenditures in the present year's budget. The demand for machinery castings has induced many foundrymen who do that class of work to make additions to their plants, and manufacturers of molding machines and sellers of foundry equipment generally are doing a very good business.

There is a decidedly better demand for power equipment for plants under 300 hp. in size, and most of the inquiries before the trade are coming from general manufacturing interests. It is invariably the case when buying is being done for a new plant that orders for power equipment are placed first, so a buying movement in the power line generally indicates that the general machinery trade will later hear of requirements.

The American Locomotive Company has contributed largely to the prosperity of the machine tool houses in this territory during the last two weeks by placing orders for a large amount of equipment for its automobile plant at Providence, R. I. The company sent out no list, and the orders were placed, in many cases, within a few days after the inquiries were made. The business was quite generally distributed, and it was apparent that early delivery was the principal consideration of the purchaser. It is estimated that orders for more than $100,000 worth of machinery were given, and this included much in the way of automatic equipment machine tools and special machinery. The business was so generally distributed that there are few machinery houses in this vicinity that did not benefit. The American Locomotive Company has ordered work begun on a three-story pattern shop at Dunkirk, N. Y., which is to cost $50,000.

The Board of Water Supply of the City of New York has awarded a contract for the building of the proposed Hill View reservoir, which is to be a part of the new Catskill water system. This reservoir will be near Yonkers, and the Willard Construction Company, Philadelphia, Pa., which has the general contract, is arranging to locate offices in the vicinity. The company's bid was $3,268,280, and it was specified that the contract must be completed within six years and four months. Machinery men who sell contracting equipment, such as excavating machinery, conveying machinery, rock drills, &c., will profit greatly from this enterprise, as they have already done an excellent business with the contractors on other sections of the Catskill water system now under way.

Some New Machinery Requirements.

Contracts are being let by the Edward Mahers Sons' Iron Foundry, Newark, N. J., for equipment for a foundry building to be erected on Berlin street, adjacent to the tracks of the Central Railroad of New Jersey at Newark. The company, which was recently formed, has secured a plot of land two acres in extent on which a building 90 x 200 ft. will be erected, with provision for future extensions. The building will be of concrete and corrugated iron, and it will be equipped with facilities for handling about 30 tons of melt a day. The company will make a specialty of machinery castings, manhole heads, &c. A power plant of 250 hp. will be installed, for which engines have been purchased. The plant will also be equipped with a 15-ton Pawling & Harnischfeger crane and the latest type of molding machines.

Contracts have been awarded by the W. H. Compton Shear Company, 314-320 Camden street, Newark, N. J., for additions to its plant, which will almost triple the company's present manufacturing capacity. The buildings to be erected include a forging shop, 30 x 40 x 60 ft., in which will be installed 12 drop hammers, power presses and a low pressure fuel oil plant. There will be a general manufacturing building, 30 x 70 ft., four stories, which will allow for the enlargement of the tool and machine room and the polishing and finishing department.

W. Ames & Co., 312 Washington street, Jersey City, N. J., have awarded a contract for the erection of a new plant for the manufacture of spikes and bolts. The plant is to be erected on Communipaw avenue, Jersey City, and the general contract has been given to the V. J. Hedden & Sons Company, 1 Madison avenue, New York. The plant will consist of a spike and bolt shop, 65 x 280 ft.; mill building, 50 x 210 ft.; storage building, 50 x 150 ft.; machine shop, 50 x 100 ft., and an office building, 30 x 40 ft. Charles H. Higgins, 15 Exchange place, Jersey City, is the engineer in charge of the building construction.

A general line of machinery used in the manufacture of steel and wood industrial cars will be required by the Wonham-Magor Mfg. Company, 30 Church street, New York, whose plant at Athenia, N. Y., was destroyed by fire several days ago. The damage amounted to about $70,000 and was fully covered by insurance. The company was running full time previous to the fire and it had considerable orders for cars for foreign shipment. This business has been taken care of elsewhere, and work will be begun at once in rebuilding and equipping the plant. As most of the company's machinery was destroyed or damaged beyond repair, a large amount of equipment will have to be bought.

The William J. Oliver Mfg. Company, Knoxville, Tenn., is enlarging its plow manufacturing department to more than double its present capacity. The company has been turning out about an average of 10,000 plows a year, and it is now arranging to make 25,000 a year. A large temporary building is being constructed to provide additional manufacturing facilities, and the necessary equipment will be installed as soon as it can be got together, as it is proposed to begin manufacturing work within a few weeks. Next year the company proposes to make permanent additions, and will probably increase its output to 50,000 plows a year.

The Augustine Rotary Engine Company, Buffalo, N. Y., has purchased a plant at Elmwood and Hertel avenues, adjacent to the Erie Railroad tracks, which was formerly occupied by the Lyman Mfg. Company. The plant is being equipped for the manufacture of rotary engines operated by steam, gas or gasoline. At present the offices of the company are at 738 Ellicott Square, Buffalo, and Benjamin F. Augustine is the president.

The Rochester Structural Steel Company, which was recently incorporated at Rochester, N. Y., has completed plans for the erection of a structural steel plant, the building of which will soon be begun. J. H. Hershey, who is identified with the Oswego Bridge Company, is president of the new company.

The New York Wire & Spring Company, which was recently incorporated under the laws of New York to take over the New York Wire & Spring Company of New Jersey, has moved its plant from Hoboken to 586-588 Washington street, New York. The company has equipped its plant entirely with electric power and will manufacture a line of agricultural implement springs, upholstery springs, oil tempered steel springs and other spring specialties.

The Orange & Rockland Electric Company, Monroe, N. Y., is preparing to add to its power equipment, and is in the market for a direct connected 60-cycle 3-phase 2300-volt unit of not less than 500 kw.

J. B. Taylor & Co., Hudson Terminal Building, 30 Church street, New York, have secured the contract for all the engineering work for the building of the electric railways between Oklahoma City and Shawnee, and also 125 miles of engineering for the Central Construction Company, Mobeetie, Texas. Engineering and building will proceed at once.

Chicago Machinery Market.

CHICAGO, ILL., December 14, 1909.

The general machinery trade in Chicago has shown a disposition to quiet down with the approach of the holidays. There is still a fair volume of business, and there is no indication that the factories will be able to catch up with their order books for a long time to come, but with the exception of a few spots, new business has been gradually slowing down for the last month, and is not expected to come forward again aggressively until after the first of the year. It is the general expectation of the most conservative men in the trade that the coming year will break all records of activity in machine tools. The active period this fall is looked upon as the preliminary skirmish of buyers, to be followed later by the whole army. While the industries using machine tools have already worked up to full activity, their business for the past year has not shown any large profits, on account of the dullness during the first half of the year and the fact that when business first improved it was necessary to accept a small margin of profit. With the prospect of a profitable year ahead of them, buyers of high class machines will be more liberal in appropriations for improvements.

Peculiar erratic features mark the progress of the machinery trade. One day one house may be unusually busy,

while others have but few customers or inquiries. One house may have a dull month and then do a good month's business in a few days. One of the leading houses, whose business was quiet during November, has had an unexpected rush of new business in December. Orders have been taken for six or eight milling machines, as well as good sales of shapers, large planers, high grade upright and radial drills and boring mills. Buyers who are unable to get satisfactory deliveries of milling machines seem to be falling back on shapers. Automobile companies represent a good share of the new business, and railroads have also contributed some very satisfactory orders, along with new business from various sources.

Improvements to be made by the Berlin Machine Works, Beliot, Wis., consist of a tool room 200 x 300 ft. of saw-tooth construction, with a gallery on one side 50 ft. wide, which will equal a second story 50 x 200 ft., and a foundry 72 x 200 ft., equipped with a 72-ft. span crane. In addition to these buildings the company will build a separate power plant and pattern house. The plant when completed will be an exact duplicate of the plant recently completed by the company at Hamilton, Canada.

Work has been commenced upon the erection of the new factory buildings at Moline, Ill., for the Monitor Drill Company, which will be removed from Minneapolis, Minn. The plant, which will employ about 1000 men when completed, is controlled by the Moline Plow Company. All possible haste will be made to get the buildings ready for occupancy.

The G. M. Diehl Machine Works, Peru, Ill., is erecting a factory 40 x 200 ft. at Wabash, Ind., which will be ready for occupancy in the near future.

The Auto Wheel Company, Lansing, Mich., recently organized with capital stock of $150,000, has taken over the plant of the Lansing Spoke Company and will install equipment for the manufacture of automobile and auto truck wheels.

The Smith & Baldridge Machine Company, Detroit, Mich., has been incorporated with capital stock of $50,000, $25,100 being paid in. The business is the continuance of a copartnership, manufacturing reverse gears for motor boats, besides doing a general machine shop business. The officers are as follows: E. S. Porter, president; H. E. Bradner, vice-president; H. T. Campbell, secretary and treasurer; J. C. Watzel, superintendent.

Finding it necessary to increase its capacity, the Oswald Motor Company, Goshen, Ind., has leased a tract of ground 55 x 330 ft. adjoining its present works upon which it will erect a two-story structure. The company is now running at full capacity with a day and a night shift, and has orders enough on hand to keep the plant going at the same rate for several months.

The city of Tamoca, Wash., has instructed the Commissioner of Public Works to advertise for bids for the construction of the dam, head works and tunnel for the power canal as soon as plans which are now being prepared by Frank C. Kelsey, engineer, are completed, and construction work on the first unit of the city's Nisqually power plant will probably be under way by February 1. The work now to be undertaken represents an expenditure of about $650,000, but the entire plant will cost approximately $2,000,000 and will require two years' time for completion.

Plans have been drawn by the Colburn Automobile Company, Denver, Colo., for the erection of an automobile factory to cost $60,000 exclusive of machinery, with a capacity of 500 machines a year. Work upon the new plant will be started as soon as a site can be secured, with the expectation of having it ready for operation by April 1.

The main building of the American Steel Dredge Works, Fort Wayne, Ind., has been completed and machinery is being installed with the expectation of having the plant ready for operation within a few weeks.

The Stafford Motor Car Company, Kansas City, Mo., incorporated with capital stock of $100,000, fully paid, has obtained an option on a tract of 10 acres in the northeastern part of the city on which it will erect a plant in the near future. The company will manufacture a five-passenger touring car, and expects to have the plant in operation by February 1. The directors of the company are: Terry Stafford, W. G. Whitcomb, C. L. Merry, C. C. Hoefer and Fred C. Merry.

The Rogers Motor Car Company, Ralston, Neb., has let a contract for the construction of its plant, which it is hoped to have ready for occupancy early in the year. The plant will be U-shaped, having about 36,000 sq. ft. of floor space. At a meeting recently held the organization of the company was completed with the election of the following officers: Ralph Rogers, president; C. A. Ralton, vice-president; C. A. Overholt, treasurer; T. G. Travis, secretary.

The Locomotive Finished Material Company, Atchison, Kan., which started business three years ago in a shop 100 ft. square, with machinery for the repair of locomotives, has increased its business to such an extent that more adequate facilities were required, and is now erecting a duplicate plant which will be equipped with machinery of the same character as the former plant, all of which has been ordered.

The Gardner Machine Company, Beloit, Wis., manufacturer of the Gardner disk grinders, has increased its capital stock from $20,000 to $100,000, and will erect a new plant containing 30,000 sq. ft. of floor space. L. Waldo Thompson, formerly with the Beloit Lumber Company, has been admitted into the company as a stockholder and officer and will become actively engaged on January 1.

Philadelphia Machinery Market.

PHILADELPHIA, PA., December 14, 1909.

The volume of business compares fairly well with that of the previous weeks, but considerable irregularity is still reported both by merchants and manufacturers. In some lines a falling off in the demand is to be noted, although in such cases the average may have been brought up by the sale of a heavier tool, or one on which the selling price may have been well up. Trade generally speaking is of a single tool character, the buyer frequently placing the order, other things being equal, with the seller that can make the best delivery. Inquiries are reported less numerous, but at the same time those that do come out usually result in an order without much delay. At this season the disposition of many buyers is to defer purchases until after the annual stock taking has been completed, for which they are now making the usual preparations. Considerable interest is shown in some directions regarding prices of machine tools in the near future; report has it that an effort will be made on the part of some dealers to get a more thorough understanding of the price situation, but nothing of a definite nature has come out in this territory. Advances in some lines are believed to be certain, but there is a feeling that if prices should be elevated too sharply buyers would have a tendency to reduce their prospective purchases, or purchase less expensive or second-hand equipment.

Machine tool manufacturers note in a number of instances a somewhat smaller volume of new business. On the whole, however, a fair run of scattered orders continues to come out, and plants maintain fairly active conditions. In some classes of special tools builders are most actively engaged, operating plants at full capacity. Industrial plants generally are more active, and in some cases still exceeding productions, which were considered high records during the prosperous years previous to 1908.

The foreign demand shows no appreciable change. A slightly better call is reported for some classes of special tools, but that for tools of the usual standard type is practically at a standstill in this district.

A fair run of business continues to be reported by second-hand machinery merchants. Buying, however, has been irregular and confined to no one particular line. The demand for second-hand engines and boilers is dull. New power equipment has been a shade more active; several fair sized orders have been placed recently, while others are under consideration.

A good volume of business continues to come to the various foundries. The activity of the steel casting plants is more pronounced and, in some instances, increasing delays in delivery are reported. Gray iron foundries report about an even volume of business.

Estimates are being made by contractors in this city for a one-story power house, 127 x 143 ft., to be built in Atlantic City, N. J., for the Atlantic City Electric Company.

The Philadelphia Roll & Machine Company had a small fire in its foundry department on the 9th inst.; the damage was slight, destroying one elevator, but in no way inconvenienced the operation of the plant. This concern reports a better volume of business, orders coming in freely for sand cast and chilled charcoal iron rolls, as well as general heavy machinery castings, including one complete 26-in. sheet mill. Deliveries are heavy on rolls, and the plant is being operated at normal capacity.

Bids for the substructure of the proposed city pier at Vine Street Wharf on the Delaware River were opened on the 10th inst. by Director Hasskarl of the Department of Wharves, Docks and Ferries. Bids ranged from $259,596 to $303,000, for the complete work. The contract was awarded to W. S. P. Shields of Philadelphia, who bid $294,000.

The Cooper Sanitary Mfg. Company of this city has been recently incorporated under the Pennsylvania laws. Frank T. Merwin is president; James E. Terry, Jr., secretary-treasurer, and Wm. S. Cooper, consulting engineer, all the foregoing being formerly connected with the Wm. S. Cooper Brass Works of this city, which has gone out of existence. The new concern will engage in the manufacture and sale of fine plumbing goods. The officials of the company inform us that they are not in the market for any machine tool equipment at this time.

The Baldwin Locomotive Works notes a continued ac-

tive demand with further good business in sight. The bulk of the orders coming out at the time are for early spring delivery, and those recently secured include one for 16 locomotives for the St. Louis & Southwestern Railroad, and about 10 from scattered customers. Work on the company's new erecting shop at Eddystone, Pa., is progressing satisfactorily; no other improvements, however, have been authorized at this time. The Baldwin Works now has 11,000 employees on its payroll, is working full day turn, and keeps a small night force on special hurry work. The plant is now being operated on a basis close to 70 per cent. of full capacity, representing a slow but steady gain.

Bids will be taken by the Department of Public Safety, city of Philadelphia, until December 20, for a large quantity of supplies to be used in the year 1910. Seventeen different classes are specified, including, among other things, repairs to elevators, rotary pumps and steam cylinders, asbestos and magnesia coverings, packings, tools, brass, iron and malleable castings, wrought iron pipe and fittings, fire brick and fire clay shapes, and miscellaneous materials for the Electrical Bureau. Samples of the articles required may be seen and specifications obtained at Room 217, City Hall.

The Department of Public Works, Bureau of Highways, Room 232, City Hall, Philadelphia, will also receive bids until December 23 for labor, tools, machinery, &c., required for general repairs to bridges, repairs to sewers and general work in connection with that department. Specifications for bids on this work are to be obtained from the director at the office mentioned.

Cleveland Machinery Market.

CLEVELAND, OHIO, December 14, 1909.

Machinery houses report a good demand for small lots of machine tools, and while few large orders are in sight the indications are that December will be a satisfactory month in the trade. Inquiries are quite plentiful, but a considerable portion of them will not result in the placing of orders until after the holidays, the prospective purchasers stating that they are ascertaining what they want and prices, so that they will be in a position to buy soon after the first of the year. The heaviest demand is for lathes, drill presses and milling machines in medium sizes. Makers of automobile parts are still the most active buyers, but there is a fair demand from other sources. Little business is now coming directly from the automobile manufacturers, but some new companies that have recently been organized in the Michigan territory are expected to be in the market for considerable equipment during the next few weeks. A local manufacturer of small sized milling machines reports a very good demand from typewriter and sewing machine factories and other users. The demand for second-hand tools continues quiet but the supply is limited.

Engineering firms are figuring on a large amount of new work in the way of new manufacturing plants, additions and power plants, much of which is expected to develop soon after the first of the year. Makers of heavy handling machinery are also working on some good inquiries that are expected to result in orders soon after January 1. Good inquiries are also out for coke plant equipment.

General conditions with machine tool builders and other manufacturers in metal working lines continues very satisfactory. Some of the tool builders report orders not quite so plentiful, but these are plants upon which a heavy demand has been made by the automobile trade during the past two or three months, and as they are filled with work for some time ahead the slight let up gives them a chance to catch up somewhat on deliveries.

Reports of the local branch of the National Metal Trades Association show that many plants continue to add to their working forces. There is a scarcity of expert machinists, including tool and die makers, but the supply of ordinary machinists is about equal to the demand.

In the foundry trade the demand for light gray iron castings continues heavy and good prices are now being obtained, the situation having steadily improved in this regard. There is still a scarcity of molders.

The Peerless Motor Car Company, Cleveland, will erect a large new power plant early next spring, plans for which are being prepared by George S. Rider & Co., engineers, Cleveland. The plant will have a capacity of from 2000 to 3000 kw. Contracts for the boilers, engines, generators, &c., will be placed as soon as the plans are completed.

The Cleveland Crane & Engineering Company, Wickliffe, Ohio, has received an order for the entire crane equipment for the American Bridge Company's Gary plant, which consists of the following: Four 40-ton 4-motor cranes, eight 10-ton 3-motor cranes, six 10-ton 2-trolley 90-ft. span cranes, five 30-ton 4-motor 80-span cranes; one 25-ton 4-motor 60-ft. span crane and one 5-ton 3-motor 60-ft. span crane.

The Fanner Mfg. Company, Cleveland, has increased its capitalization from $569,000 to $1,000,000. The increase is to provide for the extension of the business, no plant additions or purchase of new machinery being contemplated at the present time. The company reports that it is well filled with orders, its plant being run at full capacity in all departments, and that the outlook for the coming spring is very satisfactory.

The C. O. Bartlett & Snow Company, Cleveland, builders of elevating and conveying machinery, dryers, &c., reports the following recent sales: Farmers' Lime & Fertilizer Company, Canton, Ohio, complete lime and stone crushing plant, to be erected at Howenstein, Ohio; Canfield Oil Company, Cleveland, complete outfit for manufacturing paint; National Carbon Company, Cleveland, elevators and conveyors for Fostoria, Ohio, plant; D. H. & L. Stadler, Cleveland, complete elevating and conveying outfit for handling garbage; Lonyo Brick Company, Detroit, Mich., brick dryer, capacity 16,000 bricks a day; Walker-Stratman Company, Pittsburgh, Pa., steam dryer and machinery for burning pulverized coal; Pennsylvania Salt Mfg. Company, Philadelphia, elevating machinery; Portage Silica Company, Youngstown, Ohio, machinery for disintegrating and grading gravel. The large coal handling plants which this company is erecting in Canada for the McGillivray Creek Coal & Coke Company, Coleman, Alta., and the West Canadian Collieries, Blairmore, Alta., are nearly completed and will be placed in operation about the first of the year.

The Cleveland Machine Tool Works, which recently commenced the manufacture of a new horizontal boring machine, reports that it is getting all the orders that it can fill with its present capacity. The company expects to take steps soon to secure a larger plant.

The McMyler Mfg. Company, Cleveland, reports that its plant is well filled with work. This company has recently taken orders for three car dumpers for delivery next spring.

The Bruce-Macbeth Engine Company, Cleveland, reports that orders for gas engines continue plentiful, and that its plant is running full in its engine, machinery and foundry departments.

The Van Dyke Automobile Company has been organized in Detroit, Mich., to engage in the manufacture of automobiles on an extensive scale. This company expects to be in the market soon for its machinery requirements.

The Kent, Ohio, plant of the Seneca Chain Company was totally destroyed by fire December 10, causing a loss of about $50,000. The company also operates a plant at Mansfield, Ohio, to which the employees of the Kent plant will be transferred and the Mansfield plant will be placed on double turn to keep up on orders. It is announced that the Kent plant will be rebuilt at once.

The Grant-Lees Machine Company, Cleveland, which is building a large addition to its plant, has increased its capitalization from $150,000 to $200,000.

Cincinnati Machinery Market.

CINCINNATI, OHIO, December 13, 1909.

Not for years has December, the month of holiday merriment and invoice taking in the trade, shown such strength in tool making and selling lines. Dealers in this market report a uniformly strong undercurrent of both inquiry and sale, and manufacturers have really seen, as yet, no indication of any loss in interest, which just now is largely directed toward getting the earliest possible deliveries of tools and machinery under order.

The big factory suburb at Oakley is gradually getting in shape in its various parts; the manufacturers composing it are enthusiastic about its possibilities, and by the time the new year arrives the several plants there will, with a very few exceptions, be on a permanent running basis.

The Factory Power Company, which was organized to furnish power to the various concerns from a central plant, is increasing its facilities from 500 to 1000 hp., spending $60,000 for additional equipment, which is practically all purchased and much of it installed. The real estate interests of the city are taking hold of the problem of housing employees in a way quite pleasing to the manufacturers having plants at Oakley. The latter are giving their cooperation in every way possible to conduce to the best interests of their workmen.

The Cincinnati Planer Company, located at Oakley, is getting its new home in order, and expects to be entirely housed therein within 60 days. The new plant is 150 x 450 ft., and splendidly adapted for the building of its two specialties, planers and boring mills. This company is bringing out the 7, 8 and 10 ft. sizes in its new line of boring mills, and the formal announcement of this specialty will be made some time in January, according to present plans. In the planer line the company reports the best business in its history, and the week just closed the best in all respects on its books. In the list of the week's sales is an item of two heavy duty planers, 62 in. x 40 ft., both designed for general manufacturing and for installations in central territory.

The Acme Tool Company which is taking up its perma-

nent quarters in the plant being vacated by the Planer Company on Buck street, is also busy in every department on its special product, screw machines, and hopes to be permanently located inside of three or four weeks.

For the quarterly dinner and meeting of the Cincinnati branch, National Metal Trades Association, on the 15th at the Business Men's Club, arrangements have been made on an unusually elaborate scale, and the attendance will be the largest in the history of the organization. The programme of addresses includes the illustrated lecture on "Accident Prevention," by Dr. William H. Tolman, director of the Museum of Safety and Sanitation, New York City; a talk on "Co-operation," by Edwin E. Bartlett of Boston, and Charles H. Norton of the Norton Grinding Company, Worcester, Mass., will discuss the best way to meet the competition of foreign manufacturers who copy American machinery. President John W. Neil of the John H. McGowan Company will act as toastmaster. Late word from Cleveland indicates that Howard P. Eells, president of the national organization, will be present, as will also Commissioner Wuest. Indiana manufacturers from Muncie, Indianapolis and other cities will be guests. President W. T. Agerter and Superintendent M. Coakley of the Lima Locomotive & Machinery Company will be present, and Dean Schneider of the engineering department, University of Cincinnati, will escort 200 students who are taking the co-operative course at the university and the shops, the young men being specially invited to hear the addresses.

The annual meeting and dinner of the Merchants & Manufacturers' Association of Cincinnati will be held at the Business Men's Club this (Tuesday) evening. This will be the first time in the history of this association that the annual gathering has been marked with such elaboration. Prominent machinery men will be in attendance, and some plans proposed for attracting trade to the city.

The annual election of the Cincinnati section of the American Chemical Society, held at the University of Cincinnati on the 8th, resulted as follows: President, Joseph W. Ellms; vice-presidents, Archibald Campbell and Otto Dieckmann; recording secretary, Alfred Smith; financial secretary, Max H. Goettsch; executive committee, Mortimer Rye, Clarence Bahlmann, B. M. Pilhasy; representative in council, Alfred Springer.

Business with the Cincinnati Bickford Tool Company is reported as very satisfactory, particularly in their line of upright drills. Extended deliveries in most all sizes are the rule, and from stock the exception, so great has been the demand the past few months.

Radials and planers are both in better demand; all local establishments in which the last named line is built reporting good sales, particularly on the heavier machines to go into general manufacturing. One concern making a specialty of planers announces excellent business on its entire line.

The foundry melt is practically normal, and those making a specialty of machine tool castings are engaging experienced molders as rapidly as possible and the facilities of their shops will afford.

The Heer Engine Company of Portsmouth, Ohio, has been incorporated by Chris. Heer, George A. Selby, G. M. Appel, Fred N. Tynes, H. W. Heer. Capital, $50,000.

The Interlocking Company has been incorporated at Parkersburg, W. Va., to manufacture and sell improvements in nut locking devices. The capital stock is $60,000. Incorporators are W. C. De Camps, A. [illegible] Jackson, E. E. Schirmer, H. C. Jackson and A. C. Adair, all of Parkersburg.

The annual meeting of the stockholders of the American Seeding Machine Company was held at Springfield, Ohio, on December 9, and all officers and directors re-elected. Captain E. L. Buchwalter of Springfield is president. A dividend of 1½ per cent. was declared on the preferred stock payable January 15.

W. J. Hofstatter, formerly an engineer on the Wheeling & Lake Erie Railroad, has invented, and is preparing to market, a fluid pressure car lock designed to revolutionize the present methods of guarding against car robberies. The company, which is at present capitalized at $25,000, is called the Combination Fluid Pressure Car Lock Company, with offices at Toledo, Ohio. The officers are W. J. Hofstatter, president, and W. H. Thorn, A. W. Allen, Otto Augsbach and G. W. Kleppinger directors.

The Newark, Ohio, *Tribune* says that the Steel Reflector Company of Philadelphia is negotiating for a location in that city.

An establishment for the manufacture of steel vaults is under way on Galion street in Bucyrus, Ohio. It will be known as the Kelly Steel Vault Company.

Reports from Marion, Ind., indicate that the Marion Malleable Works has its full force engaged. A new series of pattern vaults is under construction in the north end of the plant under the supervision of the general manager, J. C. Haswell.

Chief Machinist W. Fenchel of the United States Navy has been recruiting machinists in Hamilton, Ohio, for service on the war vessels.

The Ralston Steel Car Company of Columbus, Ohio, expects to be operating its plant in East Columbus to capacity by the first of the year.

The new foundry plant of the Brazil Foundry & Machine Company, Brazil, Ind., is in operation.

President C. E. Morris of the C. E. Morris Iron Works Company, Columbus, Ohio, reports that plant operating to capacity with orders booked ahead for several months. Mr. Morris says the coming building season will be a record-breaker in Central Ohio.

New England Machinery Market.

BOSTON, MASS., December 14, 1909.

The chief topic of interest in the trade is the successful standardization of the engine lathe by the American builders, and also the standardization of the stroke of the shaper. The advance in the price of lathes has become general, the readjustment amounting to about 5 per cent., taking the average of the various lines and sizes. A gradual redesigning of both types of machines will follow, the change being greater in the lathes, because more parts are affected. To the customer there will be a distinct advantage, as he will have a more standard equipment among machines of different makes, each, however, retaining the individual features of its builder.

The market continues strong, in that there has been no recession resulting from the advent of the inventory season, and the approach of the holidays.

The Connecticut Telephone & Electric Company, Meriden, Conn., will erect a new brick factory building, 40 x 100 ft., three stories, the space being required for a general increase in manufacturing capacity. The company has been making telephones and other specialties for 15 years, and during the past four years has devoted a large branch of the business to automobile and motor boat ignition specialties.

The Rollins Engine Company, Nashua, N. H., has brought out a variable speed steam engine in which the speed can be changed at will while the engine is running, giving in the smaller sizes a variation of 4 to 1 and in the larger sizes of 2 to 1. The machine is specially adapted for driving paper machines, as it eliminates the use of the cones or gears usually employed to change speeds for different papers. The company has added some new equipment lately, including a planer, cylinder boring machine, a Bullard vertical boring mill and a high duty drill. Other machinery will be purchased as business resumes its normal condition.

The entire property of the Duplex Roller Bushing Company, Belfast, Maine, will be sold by the receivers, December 18, including the machinery.

A late dispatch from St. Albans, Vt., states that the Colton Combination Tool Company, Easthampton, Mass., will remove its business to the former city, a controlling interest in the stock having been acquired by local capital.

The contest as to the water power and navigation projects in the Connecticut River, between Springfield, Mass., and Hartford, Conn., may be simplified by the sale of the rights of the Connecticut River Company, at Windsor Locks, Conn., where an important industrial settlement is largely dependent upon the power developed by the canal. The syndicate, composed of the united interests of the Enfield Power Company and the Northern Connecticut Power Company, each of which had a project to create large water powers and open the river to navigation, has offered the Connecticut River Company $400,000 for its rights, and the matter is now under consideration. The controversy had got into Congress, the National Government controlling the river in its navigation. The proposition is to establish a great power station at Enfield, Conn., in conjunction with which locks will be built, under Government supervision, to take care of navigation where now it is impossible for boats of any size.

The Portland Power & Development Company, Portland, Maine, has acquired what is known as the Damariscotta plant of the Centrifugal Leather Board Company and will develop the privilege for power purposes, the idea being to transmit electricity to Boothbay, Maine.

The Turner & Seymour Mfg. Company, Torrington, Conn., manufacturer of brass and other metal goods and gray iron castings, is contemplating the erection of a foundry building, 52 x 100 ft., of brick with steel trusses, but states that no decision has been reached as to when the work will begin.

The Henry Perkins Company, Bridgewater, Mass., states that if business keeps up at the present rate the machine department will have to be increased in the spring. The company manufactures wire nail and tack machines and gray iron, brass and composition castings. A recent addition to its line is a machine for straightening tank plate.

The International Machine & Screw Company, Springfield, Mass., proposes to erect a shop of considerable size in that city. A screw machine of an entirely new type, the invention of George T. Warwick, will be built. Theodore W. Leete is president and treasurer of the corporation, Mr. Warwick, first vice-president, and Gorham C. Parker, second vice-president. The authorized capital stock is $500,000.

The appropriations called for in the recommendations to Congress carry with them but a small opportunity for the New England trade, the only item thus far brought out being $58,000 for the modernization of the machine shop at the Watertown Arsenal, which probably means the application of a considerable part of the sum for the building itself.

The Bangor Railway & Electric Company, Bangor, Maine, has purchased the entire property known as the Veazie Mills water power and dam, in which it has had a one-quarter interest for several years. A new dam will be built, which will save 1000 hp. now going to waste. It is understood that further development of electric power will follow.

A dispatch from Rockland, Maine, states that the New England Portland Cement Company will erect a new plant in that place, with a capacity of a million barrels a year. The company will build a railroad for hauling the materials.

E. W. Shattuck, Springfield, Mass., will erect a factory building, 60 x 110 ft., five stories, which will be occupied by the Milton Bradley Company, manufacturer of toys, games, &c. It will be located on Cross street.

The transformer station of the Connecticut River Transmission Company, Worcester, Mass., which was about to start up, supplying local industries with large units of power, was destroyed by fire December 10, with a loss of about $20,000. The plant will be replaced immediately.

The A. G. Barrow Company, Bridgeport, Conn., has built an addition to its works doubling the capacity, and is to install equipment for hardening high speed tool steels. Additional furnaces and baths will be put in for use in the general business, which comprises case hardening, tool steel hardening and heat treating and annealing, as well as the treatment of high speed steels.

The Locke Regulator Company, Salem, Mass., manufacturer of steam appliances, has brought out an addition to its line of automatic valves and engine stops, consisting of a type for small engines having a supply pipe up to and including 3½ in.

A company is organizing at Orange, Mass., to take over and operate the business and plant of the Grout Automobile Company of that town, which has been in the hands of a receiver for two years, during the settlement of an estate. Prominent men of the town, including John W. Wheeler, president of the New Home Sewing Machine Company; Fred A. Dexter, treasurer of the Leavitt Machine Company, and G. E. Dexter, of the Chase Turbine Mfg. Company, have subscribed for a large portion of the proposed $100,000 of new stock, and it is confidently expected that no hitch will occur to prevent the carrying out of the plans.

Miscellaneous Machinery and Power Equipment.

The Peerless Tile & Mfg. Company, Union, Ind., recently incorporated with capital stock of $15,000, has secured a site and is now erecting a factory which will be ready for operation by January 1. The officers of the company are: J. J. Downing, president; A. Steele, vice-president; J. A. Shockney, treasurer; John Moffet, secretary and general manager.

The Ideal Sanitary Mfg. Company, New Castle, Ind., has been incorporated with capital stock of $27,000 to manufacture patented utensils, the incorporators being L. J. Graffort, T. E. Drown, S. D. King and others.

Midland, Texas, has voted a bond issue of $50,000 for the construction of a water works system.

The Eldred Drainage Levee District, Eldred, Ill., is having plans prepared by the Harmon Engineering Company, 120 Ferdonia avenue, Peoria, Ill., for a drainage pumping plant to cost $140,000.

Russell, Kan., has plans ready for a system of water works to cost $65,000.

The following improvements are under consideration by the Federal Government at Fort Logan, Colo., Chase Dister, captain and constructing quartermaster, U. S. A.: Water system, capacity 45,000,000 gal., approximate cost, $35,000; sewerage system, with disposal plant, approximate cost, $32,000; laundry, approximate cost, $20,000.

The Denver Gas & Electric Company, Denver, Colo., is contemplating the construction of a new power plant which will greatly increase its lighting facilities.

The Belknap Power Company, Salt Lake City, Utah, has filed articles of incorporation with capital stock of $300,000. The company is officered as follows: James Long, Jr., president; J. C. Wright, vice-president; M. L. Weimer, secretary; J. B. Weimer, treasurer.

The Northern Indiana Gas & Electric Company, Hammond, is contemplating the erection of a new power plant, but no definite plans have been made as yet.

The Evansville Public Service Company, Evansville, Ind., has been incorporated with capital stock of $250,000 to operate a heat, light and power supply plant. The directors are: J. T. Noake, C. W. Knisely, C. A. Gillham and others.

The city of Cottage Grove, Ore., is having plans prepared for a water works system to cost $100,000.

California, Mo., is having plans prepared for a water works system to cost $30,000. Burns & McDonnell, Kansas City, Mo., are consulting engineers.

The Virginian Electric & Machine Works, Charleston, W. Va., has purchased the Agnew Electric Company's plant and contemplates extensive repairs.

The Fulton Bag & Cotton Mills, Atlanta, Ga., will build a branch factory at New Orleans, La.

The Board of Water Commissioners, Detroit, Mich., Benj. F. Guiney, secretary, will receive sealed proposals until 12 o'clock noon December 28, for furnishing and erecting structural steel and ironwork for the engine room building of the new pumping station.

The New Method Stove Company, Mansfield, Ohio, will early in the spring erect three factory buildings, all three stories, one 58 x 122 ft. and the other two each 30 x 100 ft.

The Yuster Axle & Transmission Company has been organized at South Bend, Ind., and incorporated with $100,000 capital stock to manufacture automobile parts. The directors are M. L. Yuster, A. E. Wile and Joseph W. Rickets.

The Sanitary Screen Company has been organized at Indianapolis, Ind., and incorporated with $10,000 capital stock to manufacture sanitary screens. The directors are W. C. Davis, J. H. Jordan, C. L. Clancy and Rosa B. Lewis.

The Kokomo Sanitary Mfg. Company has been incorporated at Kokomo, Ind., with $30,000 capital stock to manufacture general household and kitchen ware. The directors are Herbert Machin, J. H. Ellis, W. H. Turner, W. W. Drinkwater and G. L. Davis.

The Board of County Commissioners of Clay County, Indiana, meeting at Brazil, has granted a franchise to the Electric Transmission Company of Cincinnati, Ohio, to extend its lighting system from Jasonville to Coalmount, a distance of seven miles, for the purpose of supplying light and power to the latter town and to farmers and others along the way.

The Adrem Motor Company has been organized at Newcastle, Ind., and incorporated with $30,000 capital stock to manufacture motors. The directors are H. E. Jennings, J. D. Smith, W. C. Bond, E. F. Burk, D. W. Kinsey and H. C. Chase.

The Primm Oil Engine Company has been incorporated at Van Buren, Ind., with $40,000 capital stock to manufacture engines. The directors are J. M. Primm, B. J. Stranahan, I. C. Mills, W. B. Mills and A. B. Chauvront.

The Home Light & Water Company, Bloomfield, Ind., has increased its capital stock from $20,000 to $30,000. M. E. Dugger is president.

The Board of Public Works, Indianapolis, Ind., will receive bids December 22 for the erection and installation of two passenger and one freight elevator in the new City Hall Building; also for the erection and installation of a vacuum cleaning system and a mail chute.

Government Purchases.

WASHINGTON, December 14, 1909.

The following bids were opened December 7 for machinery for the navy yards:

Schedule 1900, Class 1.—One back geared power feed drill press—Bidder 38, Compressed Air Machinery Company, San Francisco, $182; Bidder 89, Henshaw, Bulkley & Co., San Francisco, Cal., $115 and $142; Bidder 113, J. P. Kemp, Baltimore, $135 and $118.50; 134, Manning, Maxwell & Moore, New York, $95, $122 and $150; 151, Pacific Tool & Supply Company, San Francisco, $110.

Class 2.—One precision lathe—Bidder 4, American Watch Tool Company, Waltham, Mass., $1584.02; 134, Manning, Maxwell & Moore, $700; 151, Pacific Tool & Supply Company, $693.

Schedule 1962, Class 91.—Two motor driven planing machines—Bidder 134, Manning, Maxwell & Moore, New York, $12,662; 135, Niles-Bement-Pond Tool Company, New York, $15,995; 202, William Sellers & Co., Philadelphia, $14,250.

Class 92.—One horizontal boring, drilling and milling machine—Bidder 135, Niles-Bement-Pond Company, $17,800.

Schedule 1964, Class 101.—One automatic bevel gear planer—Bidder 78, Gleason Works, Rochester, N. Y., $2500.

Schedule 1965, Class 111.—One belt driven vertical boring and turning turret machine—Bidder 21, Ballard Machine Tool Company, Bridgeport, Conn., $1019; Bidder 66, W. W. Foster Company, New York, $1035; 69, Fairbanks Company, New York, $1400; 135, Niles-Bement-Pond Company, New York, $1275 and $1960.

Schedule 1968, Class 131.—One vertical double acting single pump—Bidder 12, Blake & Knowles Steam Pump Works, New York, $1398; 48, M. T. Davidson Company, Brooklyn, N. Y., $1295; 218, Union Steam Pump Company, New York, $1867; 224, Warren Steam Pump Company, New York, $1060 and $1360.

Trade Publications.

Electrical Supplies.—Pettingell-Andrews Company, Pearl street and Atlantic avenue, Boston, Mass. Monthly publication, *Juice*. The December number is devoted to illustrating and describing electrical goods suitable for Christmas decorations and presents, including a new line of flower and fruit metallic filament lamps. A short essay on the "Factors of Economical Meter Testing," which describes the use of the P-M meter connection block, is included. An index covering all subjects treated in the magazine since its first issue completes the number. This publication is issued for general distribution among all

classes of users and persons interested in electricity, and copies will be sent regularly to any address.

Punching and Shearing Machinery.—The Schatz Mfg. Company, Poughkeepsie, N. Y. Catalogue A. Devoted to the description of a line of steel hand shearing and punching machines for sheets, plates, bars and structural shapes. It is stated that the steel used in the construction of these machines is far superior to either cast or wrought iron as regards resistance, solidity and ability to distribute the metal properly to resist stress. The machines illustrated and described include lever shears for sheets and plates, combined shears for all classes of work, round and square bar shears, hand punches, lever punches either with or without shears, and combination shears for all classes of work with a lever punch on the same base. A number of illustrations are given which show what the different machines can do in actual use.

Cranes. — Whiting Foundry Equipment Company, Harvey, Ill. Pamphlet. Gives a general outline of the purposes for which cranes are used in railroad yards and shops, and the illustrations are reproduced from photographs of actual installations covering the entire range of railroad crane service. Many of the designs shown have been made to meet certain special conditions which have arisen from time to time. Among these are electric gantries for wheeling locomotives with a capacity of 100 tons, built for the Great Northern Railway; electric roundhouse traveler installed by the Santa Fé system at Needles, Colo., running on overhead curved tracks, and several styles of self-supporting jib cranes for auxiliary service.

Chucking Grinders.—Bryant Chucking Grinder Company, Springfield, Vt. Catalogue, 50 pages. This device is intended, as its name indicates, to grind chuck work, and it is claimed that it possesses many advantages over the old method of doing the internal work while the piece was held in a chuck and then finishing the exterior while the support was furnished by an arbor. Wheels are provided for each of three different services: internal grinding, shoulder facing and outside grinding, all of which are placed side by side in positions which are very close to those assumed in the natural working of material. These wheels can be brought into reliable control and a series of stops insures convenient and precise duplication. An illustrated description of this machine appeared in *The Iron Age* November 4, 1909.

Air Compressors.—Union Steam Pump Company, Battle Creek, Mich. Catalogue B, 6 x 9 in., 72 pages. Special features of construction are shown and described, followed by brief descriptions and specifications of the different machines. These are single and duplex, one and two stage compressors, in either belt or direct steam driven styles, horizontal motor driven compressors, and vertical compressors arranged for either belt or motor drive. Some space is devoted to a description of the air-lift method of pumping water, and a number of tables bearing on the use of compressed air complete the book.

Lubricators.—The Biddison Mfg. Company, Madison, Wis. Pamphlet. Describes a mechanical force feed lubricator for gas, gasoline and steam engines. It is stated that the lubricator embodies all the simplicity of the check valve pump with the objectionable features eliminated, and that no matter what the consistency or temperature of the oil may be, positive lubrication is assured. Two special styles of automobile lubricators are illustrated, together with an outfit for lubricating traction engines.

Recording Instruments.—Crosby Steam Gage & Valve Company, 97 Oliver street, Boston, Mass. Set of 11 circulars. Seven different recording instruments are described. These are the recording gauge; a pressure recording gauge and ordinary dial gauge in one instrument; a gas, mine and draft recording gauge; a hydraulic press recording gauge; an air brake recording gauge; a wheel press recording gauge, and a recording revolution counter. All of these are made in accordance with the manufacturer's standard design and furnish a means for securing records with a minimum expenditure of labor.

Conveying Machinery.—The Jeffrey Mfg. Company, Columbus, Ohio. General Chain Catalogue No. 81, 6 x 9 in., 368 pages. A general price-list and descriptive catalogue of elevating, conveying and power transmitting machinery and chains. Numerous general illustrations serve to suggest the character of the work done by this class of machinery and its almost universal field of application, a large number of which are taken from working plants where one or more different types of machines have been installed. All the various pieces entering into the construction of machinery for the purposes mentioned above are illustrated and prices given. To facilitate finding any specific machine or part or chain, two comprehensive indices are included.

Coal Cutters.—The Jeffrey Mfg. Company, Columbus, Ohio. Bulletin No. 18. A complete line of coal cutting machines designed for operation by electricity or compressed air is illustrated and described. The illustrations include typical photos of the different cutters in operation as well as views of the machines themselves. All of the cutters presented in this bulletin are of the latest and most improved designs, and each, it is stated, represents the most efficient machine for the class of work it is designed to do.

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The La Belle Iron Works, Steubenville, Ohio, has declared a quarterly cash dividend of 2 per cent., payable December 31. The present dividend is paid to make the dividend dates January, April, July and October, instead of February, May, August and November, as formerly.

John F. Miller has been elected a director of the Westinghouse Air Brake Company, to fill the vacancy caused by the death of John Caldwell, the late treasurer. R. F. Emery, formerly assistant treasurer, was elected treasurer, succeeding Mr. Caldwell.

The strike of the puddlers at the plant of A. M Byers & Co., Inc., at Girard, Ohio, has been settled and the men have returned to work.

CURRENT METAL PRICES.

The following quotations are for small lots. Wholesale prices, at which large lots only can be bought, are given elsewhere in our weekly market report.

IRON AND STEEL—

Bar Iron from store—

Refined Iron:
1 to 1⅛ in. round and square, 1½ to 4 in. x ⅜ to 1 in. ₱ lb 2.00¢
1½ to 4 in. x 1/16 to 5-16 ₱ lb 2.20¢
Rods—¾ and 11-16 round and square ₱ lb 2.20¢

Angles: Cts ₱ lb
3 in. x ¼ in. and larger 2.25¢
3 in. x 3-16 in. and ⅛ in. 2.50¢
1½ to 2½ in. x in. 2.35¢
1½ to 2¾ in. x 3-16 in. and thicker 2.25¢
1 to 1¼ in. x 3-16 in. 2.35¢
1 to 1¼ x ⅛ in. 2.45¢
⅞ x ⅛ in. 2.55¢
¾ x ⅛ in. 2.65¢
⅝ x ⅛ in. 3.70¢
⅛ x 3-32 in. 4.50¢

Tees:
1 in. 2.50¢
1¼ in. 2.60¢
1½ to 2½ x ¼ in. 2.30¢
1½ to 2½ x 3-16 in 2.50¢
3 in. and larger 2.30¢

Beams 2.25¢
Channels, 3 in. and larger 2.25¢
Bands—1½ to 6 x 3-16 to No. 8 2.45¢
"Burden's Best" Iron, base price 3.25¢
Burden's "H. B. & S." Iron, base price 3.05¢
Norway Bars 3.50¢

Merchant Steel from Store—

per lb
Bessemer Machinery 2.00¢
Toe Calk, Tire and Sleigh Shoe 2.50@3.00¢
Best Cast Steel, base price in small lots 7¢

Sheets from Store—

Black

	One Pass, C.R Soft Steel.	R. G. Cleaned.
No. 16	₱ lb 2.90¢	3.00¢
Nos. 18 to 21	₱ lb 2.95¢	3.10¢
Nos. 22 and 24	₱ lb 3.05¢	3.20¢
No. 26	₱ lb 3.10¢	3.30¢
No. 28	₱ lb 3.20¢	3.50¢

Russia, Planished, &c.

Genuine Russia, according to assortment, ₱ lb 12 @14½
Patent Planished, W. Dewees Wood, ₱ lb A, 10¢; B, 9¢ net.

Galvanized.

Nos. 14 to 16 ₱ lb, 3.30¢
Nos. 22 to 24 ₱ lb, 3.55¢
No. 26 ₱ lb, 3.75¢
No. 28 ₱ lb, 4.10¢
No. 20 and lighter 36 inches wide, 25¢ higher.

Genuine Iron Sheets—

Galvanized.

Nos. 22 and 24 ₱ lb .5 25¢
No. 26 ₱ lb .6.25¢
No. 28 ₱ lb .7 25¢

Corrugated Roofing—

2½ in. corrugated.

	Painted	Galvd.
No. 24 ₱ 100 sq. ft.	$3.85	4.80
No. 26 ₱ 100 sq. ft.	2.95	4.00
No. 28 ₱ 100 sq. ft.	2.60	3.75

Tin Plates—

American Charcoal Plates (per box.)

"A.A.A." Charcoal:
IC, 14 x 20 $6.35
IX, 14 x 20 7.60

A. Charcoal:
IC, 14 x 20 $5.30
IX, 14 x 20 6.40

American Coke Plates—Bessemer—
IC, 14 x 20 107 lb $4.40
IX, 14 x 20 5.40

American Terne Plates—
IC, 20 x 28 with an 8 lb. coating $8 30
IX, 20 x 28 with an 8 lb. coating 10.30

Seamless Brass Tubes—

List November 13, 1908. Base price 18¢

Brass Tubes, Iron Pipe Sizes—

List November 13, 1908. Base price 19¢

Copper Tubes—

List November 13, 1908. Base price 22¢

Brazed Brass Tubes—

List August 1, 1908. 20½¢ ₱ lb

High Brass Rods—

List August 1, 1908. 15¼¢ ₱ lb

Roll and Sheet Brass—

List August 1, 1908. 15¼¢ ₱ lb

Brass Wire—

List August 1, 1908. 15¼¢ ₱ lb

Copper Wire—

Base Price. Carload lots mill 15¼¢

METALS—

Tin—

Straits Pig ₱ lb 35 @35½¢

Copper—

Lake Ingot ₱ lb 14¾@15 ¢
Electrolytic ₱ lb 14¾@15 ¢
Casting ₱ lb 14¼@14½¢
Sheet Copper Hot Rolled, 16 oz (quantity lots) ₱ lb 18 ¢
Sheet Copper Cold Rolled, 1¢ ₱ lb advance over Hot Rolled.
Sheet Copper Polished 20 in. wide and under, 1¢ ₱ square foot
Sheet Copper Polished over 20 in. wide, 2¢ ₱ square foot.
Planished Copper, 1¢ ₱ square foot more than Polished

Spelter—

Western ₱ lb 7⅛@7¼¢

Zinc.

No 9, base, casks ₱ lb 8½¢ | Open ₱ lb 9¢

Lead.

American Pig ₱ lb 5¼@5½¢
Bar ₱ lb 6⅛@6¼¢

Solder.

½ & ½, guaranteed ₱ lb 21 @21½¢
No. 1 ₱ lb 18 @18½¢
Refined ₱ lb 16¼@16½¢
Prices of Solder indicated by private brand vary according to composition.

Antimony—

Cookson ₱ lb @10¢
Halletts @9½¢
Other Brands @9 ¢

Bismuth—

Per lb $2.00@$2.25

Aluminum—

No. 1 Aluminum (guaranteed over 99% pure), in ingot for remelting 34¢
Rods & Wire Base Price 31¢
Sheets Base Price 33¢

Old Metals.

Dealers' Purchasing Prices Paid in New York

	Cents
Copper, Heavy cut and crucible ₱ lb	11.50@11.75
Copper, Heavy and Wire ₱ lb	11.00@11.25
Copper, Light and Bottoms ₱ lb	10.00@10.25
Brass, Heavy ₱ lb	7.75@ 8.00
Brass, Light ₱ lb	6.50@ 6.75
Heavy Machine Composition ₱ lb	10.50@10.75
Clean Brass Turnings ₱ lb	7.50@ 7.75
Composition Turnings ₱ lb	8.50@ 8.75
Lead, Heavy ₱ lb	....@ 3.75
Lead Tea ₱ lb	....@ 3.50
Zinc Scrap ₱ lb	....@ 4.50

THE IRON AGE

The oldest paper in the world devoted to the interests of the Iron, Machinery and Metal Trades, and a standard authority on all matters relating to those branches of industry.

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